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# Illinois Environmental Protection Agency

Southeast Rockford Source Control Operable Unit Focused Feasibility Study Volume III of III

September 5, 2000

**Final** 

**Project Number: 1681** 

Report

SEP 0 6 2000

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#### Appendix

- A Risk Assessment Reports
- B Backup for Contaminant Fate and Transport Analysis
- C Contaminated Material Volume Calculations
- D Detailed Cost Backup

#### List of Abbreviations

#### **Abbreviation**

1,1,1-TCA 1,1,1-Trichlorethane 1,2-DCA 1,2-Dichloroethane

ARAR Applicable or Relevant and Appropriate Requirement

bgs Below Ground Surface BRA Baseline Risk Assessment

BETX Benzene, Ethylbenzene, Toluene, and Xylene

CAA Clean Air Act

CDM Camp Dresser & McKee

CERCLA Comprehensive Environmental Response, Compensation and Liability Act

CFR Code of Federal Regulations cm/s Centimeters per second

COPC Contaminant of Potential Concern

CWA Clean Water Act
DCA Dichloroethane
DCE Dichloroethene

DNAPL Dense Non-Aqueous Phase Liquid
ERSV Exposure Route Specific Values
ETX Ethylbenzene, Toluene, and Xylene

FFS Focused Feasibility Study
FOC Fraction of Organic Carbon
GMZ Groundwater Management Zone

gpm Gallons per Minute

HHRA Human Health Risk Assessment

HI Hazard Index HQ Hazard Quotient

HSWA Hazardous and Solid Waste Act Amendments of 1984

HWIR Hazardous Waste Identification Rule
IDPH Illinois Department of Public Health
IEPA Illinois Environmental Protection Agency
IGWPA Illinois Groundwater Protection Act

IRIS Integrated Risk Information System

IDW Investigation Derived Wastes
ISWS Illinois State Water Survey
LDRs Landfill Disposal Restrictions
LNAPL Light Non-Aqueous Phase Liquid

kg Kilogram

MCL Maximum Contaminant Level
MCLG Maximum Contaminant Level Goal

ug/kg Micrograms per kilogram ug/L Micrograms per liter

mg Milligram

MGD Million Gallons per Day mg/kg milligram per kilogram

MSL Mean Sea Level

MTRs Minimum Technology Requirements
NAAQS National Ambient Air Quality Standards

NAMS National Air Monitoring Station NAPL Non-Aqueous Phase Liquid

NCLP National Contract Laboratory Program

NCP National Oil and Hazardous Substance Pollution Contingency Plan

NOAA National Oceanic and Atmospheric Administration NPDES National Pollutant Discharge Elimination System

NPL National Priorities List

PAH Polycyclic Aromatic Hydrocarbons

PCB Polychlorinated Biphenyls

PCE Tetrachloroethene

POTW Publicly Owned Treatment Works

ppb parts per billion ppm parts per million

PQL Practical Quantitation Limit PRA Preliminary Risk Analysis

RA Risk Assessment
RAL Removal Action Level

RfD Reference Dose

RBC Risk Based Concentration

RBCA Risk Based Corrective Action Model
RCRA Resource Conservation and Recovery Act

RI/FFS Remedial Investigation/Focused Feasibility Study

ROD Record of Decision

SARA Superfund Amendments and Reauthorization Act

SCGV Soil Component of Groundwater Ingestion Exposure Route Values

SCOU Source Control Operable Unit SCL Source Control Leachate SCS Source Control Soil SDWA Safe Drinking Water Act

SMCL Secondary Maximum Contaminant Level SPLP Synthetic Precipitation Leachate Procedure

SSL Soil Screening Level

SVOC Semi-Volatile Organic Compounds

TACO Tiered Approach to Corrective Action Objectives

TBC To Be Considered
TCA Trichloroethane
TCE Trichloroethylene
TCL Target Compound List

TCLP Toxicity Characteristic Leaching Procedure

TOC	Total Organic Carbon
TSCA	Toxic Substance Control Act
UCL	Upper Confidence Limit
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

## APPENDIX C CONTAMINATED MATERIAL VOLUME CALCULATIONS

KUCKLORD FS Area 4- Volume Cales DATE CHECKED \_ 3/16/12. CHECKED BY \_

JOB NO. - SECOND COMPUTED BY A VESSELL PAGE NO. .

TAREA 4

\* Re-visit contaminated volume calculations bosed on Mew Tier II Soil Remoderation Objectives.

Only compound for Arca 4 (RBSL atten) is for 1,1,1- Trichicrocthane = 9.12 mg/kg

#### General Notes

- + From Phase I/I :
  - Soil Gas highest @ N + N central trea of Parking Lot
    - · Depin 600 23 ft
    - · GW Condain shown to be shallow
    - · C 1, product 28'-26' in 384-6
    - · Boundaries of contam. area : N/Certical Tarking Lot
      W: Marshall St
      N: Swedice Elds
      F: 7
    - · Mest harly contamnated area 150' x 70', & "hick = 1100,0"

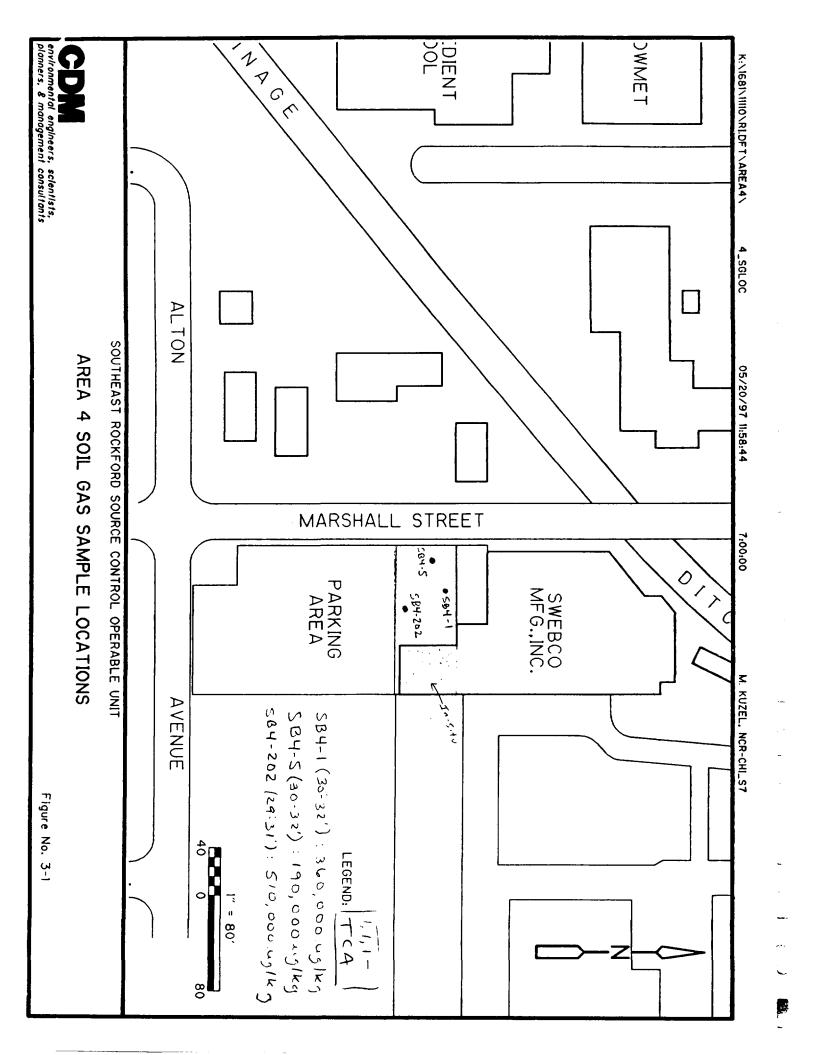
  - + From Scau:
    Gwa 29' bgs meanthe scurce
    - · Subsurface soil Vochen in ac 284-202, 2027-35' 31-81 also states of the soil 40-52 ppm 18'bgs, 71ppm
- + General:
  - · Roughly centered on SB4-202 (scou) & SB4-1 (Chastill)
  - · Soil gasdala considered, but noted that you migration to unpowed areas was identified. Therefore, high SG dala did not nicescorely indicate source areas when coordinated u/soil boring data.

```
JOB NO. 1601 73561 COMPUTED BY AVESTELL
CAMP DRESSER & MCKEE
                                             DATE CHECKED YILLE
               PROJECT ROCKFUED FS
                 DETAIL AREA 4 Volume Calcs
                                               CHECKED BY _
       -> Moing 9.12 ing/kg (ppm) for soil rem. obj ...
       Locations of 1,1,1-TCA Exceedance
           · SB-202-8 (29'-31'), 6/96 [510,000 ng/kg]
           · SE4-IF (30'-32'), 6/93 [360,000 malka]
           · 584-5F (30-32'), 6/93 [190,000 walkg]
       | Area4 - Contominated trea |
 Porking: (1.05" \times 0.6") + (0.5" \times 0.05") = 0.655 \text{ in}^2
                                                     (Scale: 1"= 80')
                                                   = 4.200 ft2 Area [20]
     ineath
Bldg : (0.5" \times 0.6") = 0.3 \text{ in}^2 \longrightarrow \underline{1920 \text{ ft}^3 \text{ Area}} \left( \underbrace{\text{Below}}_{\text{Eldg}} \right)
(In-situ)
    Area
Beneath
           Assuming: - Water @ 29'
- Contaminated Thickness = 25'-37' (12ft)
                                                             (based on RImfort analytical)
       Area 4 - Containing Trd Volume
       Parking Lot: 4,200 ft = 12ft = 50,400 ft = 1870 yd total
                   - Unsaturated (25'-29') = 625 yd3
                   - Saturated (29'-37') = 1,245 yd3
        Total Excavated Volume: 4,200ft = 155,400ft3
        Clean Backfill 4,200 ft x 25ft = 105,000(+3) 3,900 vd3 Clean Backfill
        In-situ (Beneath): 1920ft2 * 124+ = 23,040 ft3 3 855 yd3

To-situ (Bldg): 1920ft2 * 124+ = 23,040 ft3 3 855 yd3

To-situ (Bldg): 1920ft2 * 124+ = 23,040 ft3 3 855 yd3
                  - saturated (29-371) = 570 yd3
```

ALL VOLUME CONTAM = 2,725 yd3



= X: d T IT BSI - attached VOC-UL-4

Date Sampled		6/12/96		6/12/96		6/27/96	6/12/96	6/12/96
Sample Number		SB4-107(S)		SB4-107(D)		SB4-202-8	SB4-104(D)	SB4-103(S)
Depth (ft. bgs)		15-17		22-24		29-31	22-24	15-17
Organic Traffic Report Number		EBGB4		EBGB5		EBGR3	EBGA9	EBGA5
Volatile Organics (ug/Kg)	·			<del></del>				
Chloromethane	11 U			13		27000 U	10 U	10 U
Bromomethane	11 U			13		27000 U	10 U	10 U
Vinyl Chloride	11 U			13		27000 U	10 U	10 Ū
Chloroethane	11 U			13		27000 U	10 U	10 U
Methylene Chloride	11 JE		JBU		BU	27000 BJU	10 JBI	
Acetone	17 B		JBU		JBU	27000 U	10 JB(	
Carbon Disulfide	11 U			13		27000 U	10 U	10 U
1,1-Dichloroethene	11 U			13		27000 UJ	10 U	10 U
1,1-Dichloroethane	11 U			13		27000 U	10 U	10 U
1,2-Dichloroethene (total)	11 U			13		27000 U	10 U	10 U
Chloroform	11 U			13		27000 U	10 U	10 U
1,2-Dichloroethane	11 U			13		27000 U	10 U	10 U
2-Butanone	11 U		U	13		27000 U	10 U	10 U
1,1,1-Trichloroethane	11 U			13		510000		10 U
Carbon Tetrachloride	11 U			13		27000 U	10 U	10 U
Bromodichloromethane	11 U				U 😽	27000 U	10 U 🦠	10 U
1,2-Dichloropropane	11 U				U	27000 U		10 U
cis-1,3-Dichloropropene	11 U			13		27000 U		10 U
Trichloroethene	11 U			13		27000 U	10 U	10 U
Dibromochloromethane	11 U			13		27000 U: 13		10 U
1,1,2-Trichloroethane	11 U			13		27000 U 🦪		10 U
Benzene	11 U			13	U	27000 U	10 U	10 U
trans-1,3-Dichloropropene	11 U			13		27000 U		10 U
Bromoform	11 U			13		27000 U		
4-Methyl-2-Pentanone	11 U			13		27000 U 🖟		10 U
2-Hexanone	11 U				U	27000 U 🕾	10 U	10 U
Tetrachloroethene	11 U				U	27000 U		10 U
1,1,2,2-Tetrachloroethane	11 U				U	27000 U 🦠		10 U
Toluene	11 U				U	27000 U		10 U
Chlorobenzene	11 U				U. Bet			10 U
Ethylbenzene	11 U			13	U	27000 U 🖟	10 U	10 U
Styrene	11 U				U	27000 U	10 U	10 U
Xylene	11 U	13	U	13	U diam	27000 U	10 U	10 U

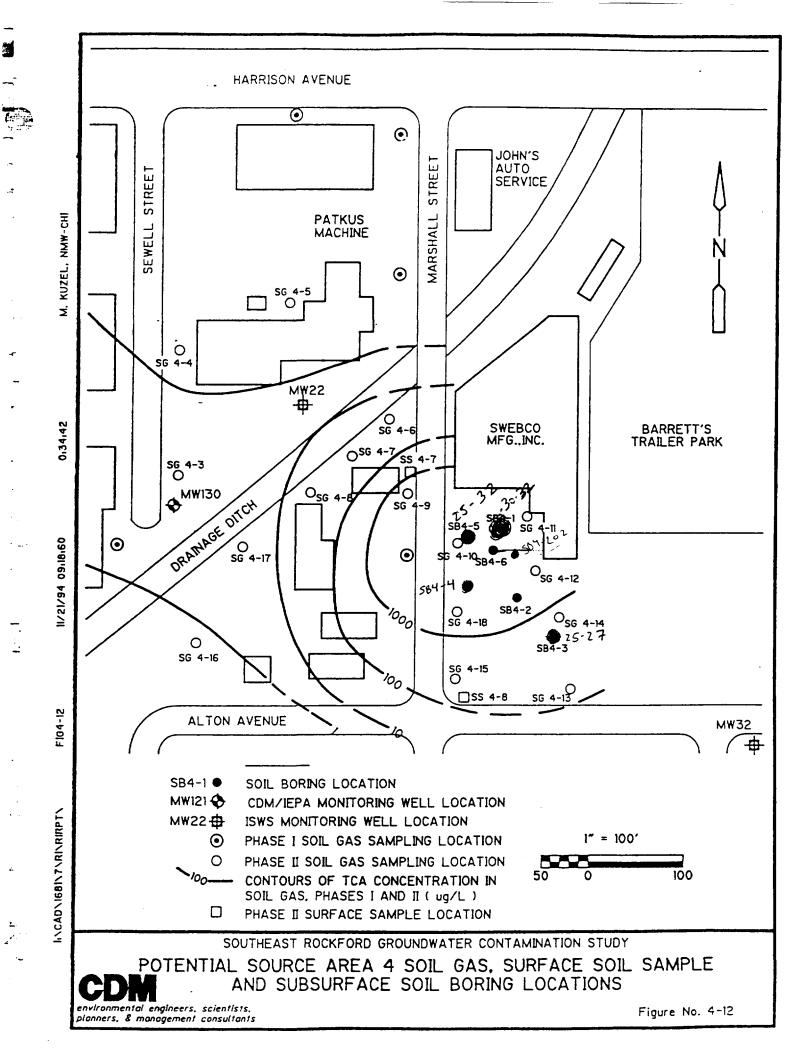
Date Sampled	6/28/93	6/29/93	6/29/93	6/29/93	6/29/93
Sample Number	SB4-1F	SB4-2A	SB4-2D	SB4-3E	SB4-3E(D)
Depth (ft. bgs)	30-32	5-7	20-22	25-27	25-27
Organic Traffic Report Number		EXR37	EXR38	EXR39	EXR40

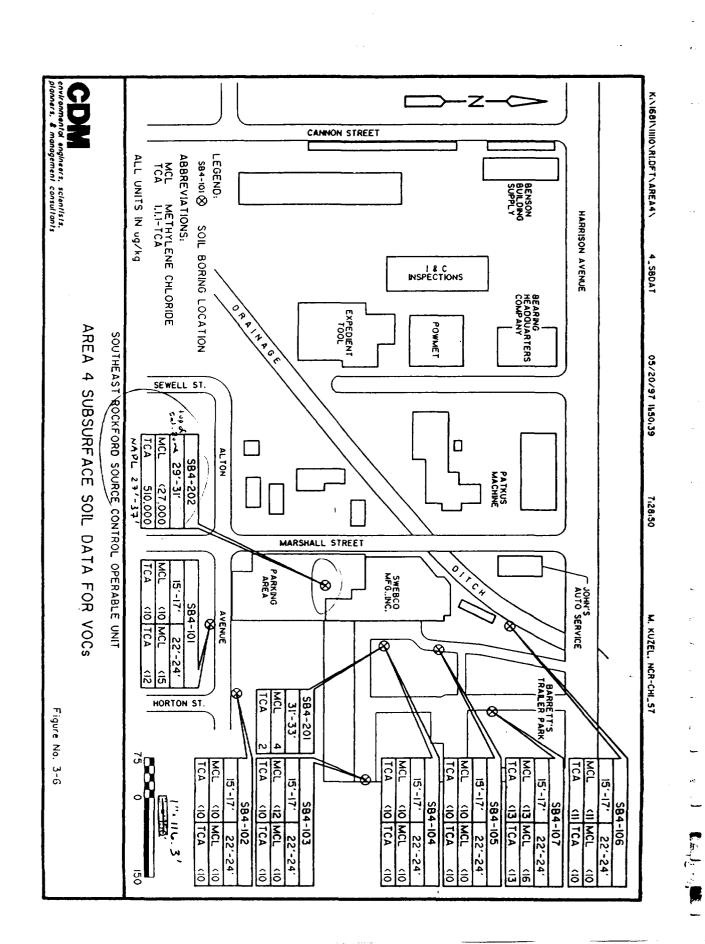
Volatile Organi≎s (ug/Kg)
Chloromethane
Bromomethane
Vinyl Chloride
Chloroethane
Methylene Chloride
Acetone
Carbon Disulfide
1,1-Dichloroethene
1,1-Dichloroethane
1,2-Dichloroethene (total)
Chloroform
1,2-Dichloroethane
2-Butanone
1,1,1-Trichloroethane
Carbon Tetrachloride
Bromodichloromethane
1,2-Dichloropropane
cis-1,3-Dichloropropene
Trichloroethene
Dibromochloromethane
1,1,2-Trichloroethane
Benzene
trans-1,3-Dichloropropene
Bromoform
4-Methyl-2-Pentanone
2-Hexanone
Tetrachloroethene
1,1,2,2-Tetrachloroethane
Toluene
Chlorobenzene
Ethylbenzene
Styrene
Xylene
•

CA	CA	CA	CA	CA
28000 U	11			
28000 U	11	U 10	U 10	U 10 U
28000 U	11	U 10	Ü 10	U 10 U
28000 U	11	U 10	U 10	U 10 U
28000 U	11	U 10	U 10	U 10 U
28000 U	11	U 5	<b>J</b>	J 6J
28000 U	11	U 10	U 10	U 10 U
28000 U	11		U. 10	U 10 U
28000 U	11			U 10 U
28000 U	11	U 10	U.2. 10	U 10 U
28000 U	11	Ü 10	U 10	U 10 U
28000 U	11			U 10 U
28000 U				U 10U
360000			J 10	
28660 0			U. 4 10	
28000 U			U 10	U 10 U
28000 U		U 10	U 10	
28000 U			U 10	
28000 U			1	
28000 U			U 10	I.~
28000 U				U 🔠 10 U
28000 U			U 2	J 10 U
28000 U		U 10		U 10 U
28000 U			U 10	U 10 U
28000 U			U 10	
28000 U				U 10 U
28000 U				Johnst 10 U
28000 U				U 10 U
28000 U				26
28000 U				J 2 J
28000 U				
28000 U				U 10 U
28000 U	11	U∞ □ 10	U 10	U 10 U

Date Sampled	6/29/93	6/29/93	6/29/93
Sample Number	SB4-4E	SB4-5E	SB4-5F
Depth (ft. bgs)	25-27	25-27	30-32
Organic Traffic Report Number	EXR41	EXR42	EXR43

Volatile Organics (ug/Kg)	CA	CA	CA
Chloromethane	10 U	10	
Bromomethane	10 Ü	10	U 14000 Ü
Vinyl Chloride	10 U	10	U 14000 U
Chloroethane	10 U	10	U 14000 U
Methylene Chloride	10 U	10	U 14000 U
Acetone	10 U	9	J 14000 U
Carbon Disulfide	10 U	10	U 14000 U
1,1-Dichloroethene	10 U	10	U 14000 U
1,1-Dichloroethane	10 U	10	U 14000 U
1,2-Dichloroethene (total)			
Chloroform	10 U	10	U. 14000 Ü
1,2-Dichloroethane	10 U	10	
2-Butanone	10 U	10	U 14000 U
1,1,1-Trichloroethane	9 J	6	J 190000 J
Carbon Tetrachloride	10 U	10	U 14000 U
Bromodichloromethane	10 U	10	U 14000 U
1,2-Dichloropropane	10 U	10	U 14000 U
cis-1,3-Dichloropropene	10 U	10	U 14000 U
Trichloroethene	10 U	10	U 14000 U
Dibromochloromethane	10 U		U 14000 U
1,1,2-Trichloroethane	10 U	10	U 14000 U
Benzene	10 U	10	U 14000 U
trans-1,3-Dichloropropene	10 U		U 14000 U
Bromoform	10 U	10	U 14000 U
4-Methyl-2-Pentanone	10 U		U 4000 U
2-Hexanone	10 U		UV 14000 U
Tetrachloroethene	10 U.		U23 14000 U3, SC
1,1,2,2-Tetrachloroethane	10 U	10	U 14000 U
Toluene	2 J	12	14000 U
Chlorobenzene	2 J		U 14000 U 3
Ethylbenzene	10 Ü		U 14000 U
Styrene	10 U		U 14000 U
Xylene	10 U	10	U 14000 U





JOB NO. 165 COMPUTED BY A Vers 1

Area 7 - Rovice Contain ich whom Total Low Remed. Opj. \* Note: Area 7p - Northingpertine & diea 7 Area 7d -1 7. " portunal Area?

Applicable	Tier II So	Characters	Objectives LE	BECation).
	Area 7	P	Objectives LE Area	7 d
Compound	me 1kg (ppm)	mg/kg (ppb)	molkg (ppm)	me/Ke(ppb)
1, 2-Dichloroethane	3.68	3680 (4)	1,790	1,790,000 M,
CIS-1, 2- Dichloracing	0.941	.941 (1)	116	14600 (2)
Ethylbenzene	57.3	57,200 (N)	953	953, CCO (N
Methylene ( Chew)	1,150,000	1.15 -10 9 (N)	2.27 ×1012	2.27210151
Tetracide ( ) ( )	1.46	1,460 (5)	136	136,000 (1)
Toluene [868]	3.38 -10	3.32 - (W)	3.74-1014	=,74×1017(N
1, 1, 1- Trichleror hane	/08	108,000(2)	19,600	19,600,000
1, 1, 2 - Trichlere i rock	0,619	619 (N:	56.3	56,300 (N)
Terchleree "here C4]		310 (4)	7.22	7,220 (3)
Xylenes ( mass)	= 4,100	34,100,000 <b>4)</b>	1.66 =167	1 66×10'0 (N

(N)= No exceedances (#) = # of exceedances

[#] , Former Tier # in ppb

-> Revised Area 7 Contamoderd (Exceeding Tier II) Areas and Volumes.

> Sample Location: (50.1 30000) Excreding Tier II (7/95)
>
> SB7-24 (4'-6') 5
>
> SB7-201 (25'-27') Area 7p SB-134 (9-11) SB7-4 (20-22') SB7-7 (25'-27') SB7-8 (15'-17') Area 7d SB7-10 (5'-7')

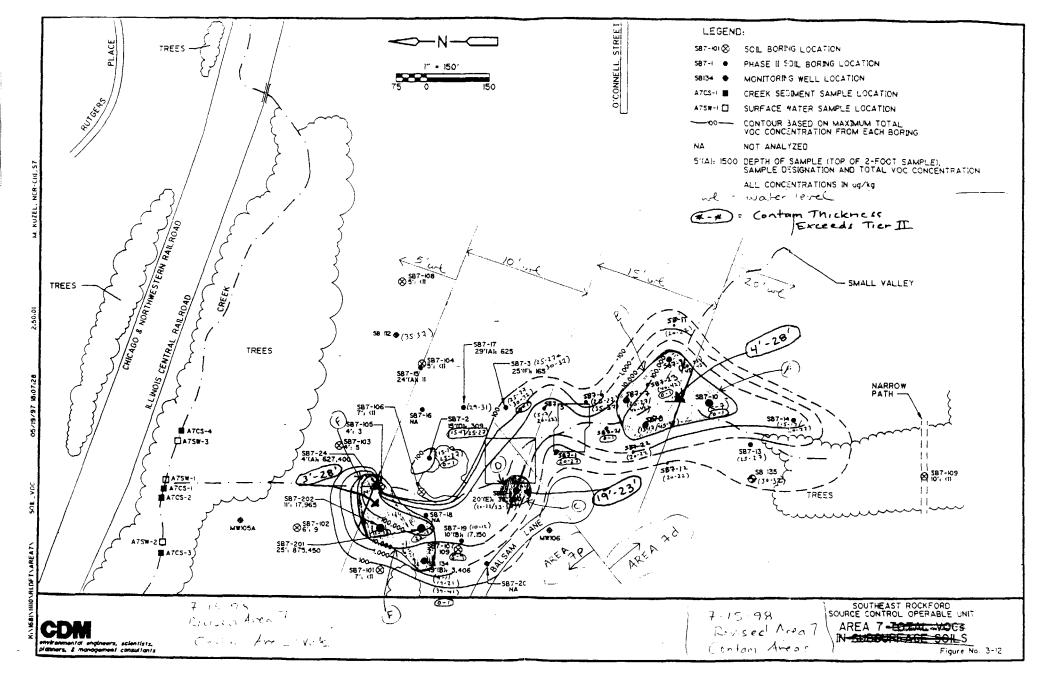
_	CAMP DRESSER &	PROJEC	PACIFORD  AKEA 7	Rev. Vols		ED Hude	COMPUTED BY DATE PAGE NO.	7-15-98 3
	Map Location (as marked)	Planincter Reading (Aug of 3)	Area (ft?)	Contam Thicknes. (ft Drys)		<pre>c wd Unsalirated Volume (4+3)</pre>	>w{   saturated   Volume   ((+1))	Clean Back fill (£+3)
	Α	5: 5:5 50 48)	11,250	4'-28'	20'	180,000	96,000	45,000
_	В	117	25,650		15'		333, 450	107,600
	C 23	10	2,250	19'-23'	15'	0	9,000	42,750
	D \ 20/	10	2,250	19'-23'	10 '	0	9,000	42,750
	E	96 97	21,825	3'-78'	10'		392,850	65,475
•	F	16 16	3,600	3'-28' (2: )	<i>5'</i>	(3-5) 7,200		10,800
	•	121		( ( )				309,375ff

Total Unsaturated Volume 622,125ft3 = 23,042 yd3 Total Saturated Volume 917,100ft3 = 33,967 yd3 -

Total Contaminated Volume: 57,009 yd3

Total Clean Backfill: 114.59 yd3

Total Excavated Volume: 68,468 yd3



I

.

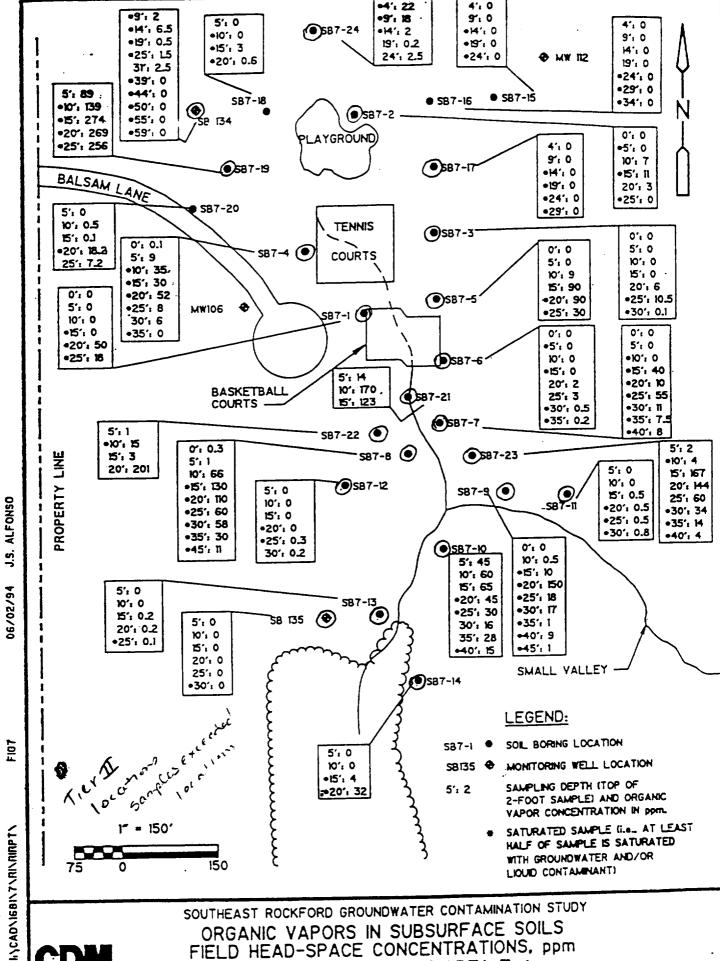
CLIENT TEDA DETAIL Area 7 Rev. Vols

CHECKED BY \_\_\_\_\_\_\_\_

JOB NO. 64 COMPUTED BY A Vessell PAGE NO. \_\_

Assumptions for Determine treas/ Volume:

- See Fig. 3-2 Marking 1 Hed " 7-15-98 Roused Aren7 Contan. America a ser contamination accomment Transform was determined on Years, to next non-excelling sample location or ~ 35ft radially (whichever were less)
- Depth of exceedance was initially based on the 2 ft interval unich excerded Tier II Goals from the analytical data. Ecception (ovm) data satisfien reviewed to determine if contamination to chaes: should be extended. In agreed, depth conxilul ormania of 50+ ppm were included explane The bear her of some on data)
- Water Greez bouce en bette 1992 + 1996 Trail al Toverhood on Finding (Phone J/II + SCOU)



environmental engineers, scientists, planners, & management consultants

FIELD HEAD-SPACE CONCENTRATIONS, ppm POTENTIAL SOURCE AREA 7 Figure No. 4-13

CAMP DRESSER & McKEE	CLIENT	JOB NO	COMPUTED BY
	PROJECT	DATE CHECKED	DATE

Area 7/12 Area Velance Lules

Boardon new (798) her It gods, there is no Panalyth at dute that shows my crecedances through then the lay is constorage from Landing Dode, it.).

There we notified that what The and Menting of the Charles with the and the an

i. The Drum Sterney area should probably be retained at least.

Sire/Carole Should make the cult on The Leading De he has her lier it creed.)

Midery original calculations based on humaions.

Cfinice

Rockford f 5 DATE CHECKED \_ 4/1195 CHECKED BY \_ UA Area9/10 Volume Calcs (So. 1) - Probable source areas include : 1) outside Storace Area (SE Corner 9th + 23rd) (see shorded awas on fig.) 2) Loading Dock - Sundstrond For now, no volume will be criticated to the means ibstremed of in the or sparging will be further investigated.

Access of excess areas is questionable. D Drum Storace area PCEste. Contam Tricking 0-15ft (Boundin EPAdala) Area = - 3: - 16 = 0.210 in = (200f1/in) = 8,400 1+2 Volume of Centain rated Material = 1 126,000 ft3 = 4,667 y d 3 ( all unsadurates) 2 Loading Dock Area (207) Contamuated Thickness 6-15' PCE Assume 0-15' as Area = 0.7" > 0.6" = 0.42 in 2 + (200/4/m)2 = 16,800 ft 2 Volume of Containinated Material = 252,000613 (als on Entrector) deletes Industrial (who then the proper m) of (colon thecames 0-51) (Drum ting they sweare Ed) Area : 04" x 0.15" = 0.00 (1. 200 A/m)2 = 2,400 (+2 12,000 f = 12,000 f = 12,000 f = 445 y d 3 (all uned-uned) Total Area 1/2: Area 1/25,200 (1) Velume / 14,000 xd 2 (378,000 fts)

JOB NO. 1681-23561

COMPUTED BY A Vecte !!

IEPA

CAMP DRESSER & McKEE

CAMP DRESSER & McKEE	PROJECT LOCK DETAIL Phone C	FS all 4/20/18	JOB NO. 1681- DATE CHECKED BY	2 35 (a) COMPUTED BY A VC.  DATE 4/2  PAGE NO. 12	20/1
Are	a 9/10/	Sne - 4/20/9 Vs. Drum St		3 ading Dock	
	·		n) other da	ta nove shallow	
•	Treat mid-St	ates as a st	nallow TCE P	sblem	
(2) Dru	n Storage Are → Top 10:	-15' - data o	n PCE ) some	that for dimersion	'S
3 Load	ing Dock: -bunch of U	STS just 5. of	loading dock	: area (see "lyf Sne sunt)	

AMP DRESSER & McKEE	PROJECT DETAIL	1 <del></del>	DATE CHECKED CHECKED BY _	1/v/96		-27-98
Gene	ral N	otes:				
	<u> </u>	Not much son and son (only 5w) -  Subsurface sonly or  related compour  sonl + 6w.	Villa da Roma	parkinglet		
	•	Contamn. Wester Water @ 1-3 Include thicker Typical contain	o' -ess -for 2000	man Come	1 mg 2 5	رمابات
+ (	•	Contam. primarily elevated chloris Checked high a retain areas a subsurfaced 3 m to the surface	ail gas vs. hi	o GW - 10.		
	•	No main and	- 3W 2			, abin

(Su cont pop for Tier I Soil Remodelin

Goals + corresponding contamnated areas + Volumes)

CLIENT JFVA PROJECT RUCKFOFS FS

DATE CHECKED \_\_

JOB NO. 16 FT 72 6 COMPUTED BY A VESSE 1)

Tier I Soil Remadation & bjectimes RBSLattonamall

	TierI	<u>so's</u>
Compound	molks (pom)	wicke (pib)
Benzenc	0.189	189 (1)
Elhylbenzenc	7,59 4.76	7,9,407,980(6)
Methylene Charles	47,900,000	1 479 copoo,000 (°)
2. Methyl phenol	2.82 -1023	2.82 × 1026 (0)
Toluene	1.06-1010	1.06 = 1013 (0)
Trichloroethene	0.0507	50.7 (1)
Xylene: (total)	24,500	24500,000 (0)

(#) = # of sample loc. exceeding Tier I

```
Areall Subsurface Song : exceeding Tier II
| SBII-16 (1967) - [56,000.uc]kg EthB] | 1993 | SBII-5H (1900) - [150,000 and lag FILB] | SBII-76 (1900) - [410.ug]kgTCE; 64,000.uc]kg EthB] | SBII-106 (1900) - [1,500.uc]kg Benzene; 590,000 kg EthB] | SBII-203 (20-41) - [20,000.uc]kg EthB] | SBII-202 (39-41) - [120,000.uc]kg FILB] | SBII-202 (39-41) - [120,000.uc]kg FILB]
```

#### Screening Data

Screening (OVM) data shows vectical extent expands the contamination thickness as follows:

CAMP DRESSER & McKEE	CLIENT FEPA  PROJECT Roch   DETAIL Area	ord Fi 1 Contain Vol	JOB N DATE CHECKED I	, a 1	DATE	1 A Verre 18 303
	c of (ontam re Fig 3-23a: treas + Volum	marked up	Titled"	Areall Con	taminostco	-(
: S	Scale 1"= 61					
(D) 3	).94" +O.72"	= 0.67.7	n > 3 600	= 5 cm/5+1+	2,43.7.	f+2 /
(2) I.	063" × 0.625	'=0.664	r* > 3600 f	1=/1-7 = [	2, 392f-	1 <sup>2</sup> V
3 (3	.32" × 1.003	)- 0.047in	² = 3.48	~ 2 × 3600 51/~	= 12,5	36 ft 2
[Benrath] (1) 1.	063" × 2.125'	' = 2.26in	2 - 3400 ft	1/m2 = 8	,132ft	. 2 ~
	Total Area	Un-coverco	( = 1	7, 365 -	142	
-30/1 6/3 -	Total Area		dg = 8	3,132 f+	z /	
: Loca	tion Area (++	1			>654	Clean Backfill (ft 3)
. 1	2,437	33'-45'	30'	0	29,244	80,421
2	2,302	31'-55'	30'	0	57,408	74,152
3	17,536	30'-42'	30'	0	150,432	376,090
Insitu (4)	8,132	31'-45'	30'	0	113,848	· NA

Total Contaminated Volume = 237,084913 = 8781yd?

(Existra enty)

[Volume Beneath Bidg. Insitu = 113,848913 = 4,217yd] Total Clean Backfill = 530,653ft3 = 19,654yd3 Total Excavated Volume - 767,73743 = 28,425yd3

	* = Excredition I Areall
	Substitace Samples Area II which have at least 1 compained
Appendix H-4: Subsurface Soil Data (Volatile Organics)	which have at least 1 compound
meat	in exceedance of Tier II goals

Date Sampled	9/24/93	9/24/93	7/13/93	7/13/93	8/25/93
Sample Number	SB7-24A	SB7-24B	SB9-1F	SB9-1F(D)	SB11-1G
Organic Trailic Report Number	EXS12	EXS13	EXR56	EXR57	EXP76
olatile Organics (ug/kg)					
thloromethane	26000	110	10 0.2	10/U	55000 U
romomethane	20000 U	11/0	1010	100	55000 U
inyi Chloride	26090 U	110	10U	10/0	55000 U
hloroethane	26000 U	1110	1010	100	55000 U
lethylene Chloride	26000 U	12	10/U	100	55000 U
cetone	B400 D	27	10 UB	10UB	55000 U
Carbon Disulfide	26000 U	110	100	100	55000 U
,1-Dichioroethene	26000 U	43	10 U	10U	55000 U
,1-Dichloroethane	26000	190	10U .	100	55000 U
2-Dichloroethene (total)	26090U	9J -	10 U	10U.	55000 U
Chloroform	28000 U	110	10 U	100	55000 U
,2-Dichloroethane	26000 B	180 :	10 U	10 U	55000 U
-Butanone	35800 W	13	10 U	10U	55000 U
,1,1-Trichioroethane	360000	51	10 U	100	55000 U
Carbon Tetrachloride	26000 U	110	10 U	10 U	55000 U
Bromodichloromethane	26900 U	11U .	10 U	10 U	55000 U
,2-Dichloropropane	×26000 U	11 U	10 U	10 U	55000 U
cls-1,3-Dichloropropens	26000 U	11 U	10 <b>U</b> ·	10 U	55000 U
Frichloroethene	24000 J	21	10 U	10 U	55000 U
Dibromochioromethane	<b>₹6000 U</b>	11 U :-	10 <b>U</b>	10U ;	55000 U
1,1,2-Trichloroethane	26000 ty	11 U	10 U ·	10 U	55000 U
Benzene	26000 U	11/0	10/0	10)U	55000 U -
rans-1,3-Dichloropropene	26000 U	11 U 🔻 🔅	10 U	10 U	55000 U
Bromoform	26000 07.1	11 U	10 <b>/</b> U	10JU	55000 U
I-Methyl-2-Pentanone	2B000{U	82	10 U ·	10 U :	55000 U
2-Hexanone	20000 U	11/0	10 U ·	10 U	55000 U
Tetrachioroethene	CA10000	22	5 J	5 J	55000 U
1,1,2,2-Tetrachloroethane	2600010	,11\U	10 U	10U	55000 U
Toluene	26000 U	4 J .	10 U	10 U	930000
Chlorobenzen <del>e</del>	26000	11/0	10 U	10 U	55000 U
Ethylbenzene	15000 J	11 U	10/U	10JU ^	56000 ×
Styrene	26000 t	11 U . 🗸	10 U	10 U	55000 U
Xylene	<b>110080</b>	19	10 U	10 U	200000

1

## Appendix H-4: Subsurface Soil Data (Volatile Organics)

Date Sampled	8/27/93	8/26/93	8/26/93	8/31/93	8/31/93
Sample Number	SB11-4L	SB11-5H	SB11-5K	SB11-6G	SB11-61
Organic Traffic Report Number	EXR84	EXR81	EXR82	EXR88	EXR89
olatile Organics (uo/kg)					
Chloromethane	110.	27000 U	24 U	12 U	12 U
Promomethane	11 U. · ·	27000 U	24 U	12 U	12 U
/inyl Chloride	11U	27000 U	24 U	12 U	12 U
Chloroethane	11 U	27000 U	24 U	12U	12 U
Methylene Chloride	3 J	27000 U	24 U	24 BJ	30 BJ
Acetone	11 UB	27000 U	24 UB	7 J	6 J
Carbon Disulfide	110	27000 U	24 U	12 U	1 ]
1,1-Dichloroethene	11 U .	27000 U	24 U .	12 U	12 U
1,1-Dichloroethane	110	27000 U	24 U	12 U	12 U
1,2-Dichloroethene (total)	11 U	27000 U	24 U	12 U	12 U
Chloroform	110	27000 U	24 U	12 U	12 U
1,2-Dichloroethane	110	27000 U	24 U	12U	12 U
2-Butanone	11 U	27000 U	24 U	12 U	12 U
1,1,1-Trichloroethane	2 J	27000 U	24 U	12 U	3 J
Carbon Tetrachloride	110	27000 U	24 U	12 U	12 U
Bromodichloromethane	110	27000 U	24 U	12 U	12 U
1,2-Dichloropropane	110.	27000 U	24 U	12 U	120
cis-1,3-Dichioropropene	11 U	27000 U	24 U	12 U	12 U
Trichioroethene	11/U	27000 U	24 U	12 U	12 U
Dibromochioromethane	11 U	27000 U	24 U '	12 U	12 U
1,1,2-Trichioroethane	11 U · i	27000 U	24 U	12 U	12 U
Benzene	5 J :	27000(U	24 UB	12 U	12 U
krans-1,3-Dichloropropene	11 U	27000 U	24 U :	12 U	12 U
Bromoform	11 U	27000 U	24 U	12 U .	12 U
4-Methyl-2-Pentanone	11 0	27000 U	24 U	12 U	12 U
2-Hexanone	110	27000 U	24 U 🗀	12 U	12 U
Tetrachloroethene	11)U	27000 U	24 U.	12 U	12 U
1,1,2,2-Tetrachloroethane	11 U	27000 U	24 U	12 U	12 U
Toluene	72 JB	230000 J	24 UB :	9 J	2 J
Chlorobenzene	11 U	27000 UJ	24 U	12 U	12 U
Ethy <b>ibenzene</b>	110	○ <del>150000</del> · ·	24 U	12 U	12 U
Styrene	11 U	27000 U	24 U	12 U	12 U
Xylene T	15 -	530000	760	12 U	12 U

3

Date Samoled	8/1/63	0/1/07	0/0/02	20,00,0		r
Sample Number	SB11-7G	\$B11-7K	SR11-AG	0/30/93	8/30/93	_
Organic Traffic Report Number	EXR91	EXR92	EXR85	EXR86	EXR87	
Volatile Organics (uolia)	)	• <b>•</b>				1
Chloromethana	1300[1	19[[[	1400111	1200111	12000	r
Bromomethene	130011	2100	0,004	Olone	0.0081	~
Vinvi Chloride	73000	0/21	14001	15001	1500 U	_
Chlorophana	19000	0121	14000	150010	1500U	_
Methodon Charles	0000	020	740010	1500[0	1500 U	~
Andreas Circles	1300 013	12 UB	2200	2100	2900	
	1300 UB	18 UB	1400 U	1500/U	15000	_
Carbon Disumde	1300 U	2.0	1400/0	1500/U	15001	~
7,1-Utchloroethene	1300∫U	12 0	1400/U	150010	15001	7
1,1-Dichloroeinane	1300 U	12 0	1400/U	1500[U	150010	_
1,2-Dichoroethene (total)	1300(U	12(0	1400JU	1500[U	1500[U	_
CHOOLOGE	1300 U	12 0	1400 U	1500 U	15001	_
1,2-Dichloroethane	1300 U	12 U	1400 U	1500 U	15001	_
Z-Bulenone	1300U	12 UB · ·	1400 U	1500 U	15001	7
1,1,1-1 richoroemane	13000	12 0	1400[U	1500[U	15001	<del>-</del>
Carbon letrachione	1300[0	1210	1400(U	1500U	1500[U	_
Brombardinens	1300 U	12 U	1400/U	1500 U	1500[U	~~
1,z-Uichoropane	1300 U	12 U	1400 U·	1500[U	1500[U	7-
CIS-7,3-Dichloropropene	1300 U	12 0	1400JU	1500(U	15001	T
richordenana	× 4101	12 U	1400[U	1500 U	1500[U	~
Chromochochomenane	1300/U	12/U ···	1400 U )	1500/U	1500 U	_
1,1,2-1 rcmorbemane	1300/U	120	1400[U ·	1500[U	15000	_
	13000	1210	1400/U	1500[U	1500[U	7
Mana-1,3-UCIIOTOPOPOPOPOPOPOPOPOPOPOPOPOPOPOPOPOPOP	13001	120	1400\U	1500[U	1500[U	·
Bromotorm.	1300 U	12.0	1400 0	1500 U	1500[0	~
4-MBITM-Z-Feriencine	13000	12.0	1400 U:	1500 U	1500/	~
2-Hexanone	1300U	12(U ·	1400 U	15000	150010	_
I etrachloroethene	1300 U.	12\U · ·	1400[U	15000	1500[U	_
7, 1, 2, 2-1 effectivoroethene		12 U	1400/U	15001	15001	~
Toluene	150000 D	) <u>(1</u> 6	43000 D	1500 U	1500[U	~
Chlorobenzene	1300 U	120	1400JU.	1500/U	1500[U	_
Elmynoanzene	G 00019 *	12 0	1400[U	1500[U	15001	_
Siyrene	1300[U	12 0	1400 0	1500U	1500/U	_
Xyiene	31000010	8,1	2000	1500[U	1500/U	~

CDM - Southeast Rockford Groundwater Contamination Study

## Appendix H-4: Subsurface Soil Data (Volatile Organics)

Date Sampled	8/31/93	9/1/93	9/1/93	12/1/93	12/1/93
Sample Number	SB11-9G	SB11-10G /	SB11-10J	8B12-1D	SB12-1H
Organic Traffic Report Number	EXR90	EXR93	EXR94	EXT40	EXT41
/olatile Organics (uo/kg)					
Chloromethans	12 U	1400 U	11 U	110	1400 U
ensitemomorE	12 U	1400 U · .	11/U	110	1400 U
/inyl Chloride	12U	1400 U	11 U	11 U	1400 U
Chloroethane	12 U	1400 U	11 0	11 U.:. : ]	1400 U
Methylene Chloride	53 BJ	1400 UB	11 UB	11 U	310 J
Acetone	12 U	1400 U	16 UB	1110	1400 U
Carbon Disuifide	3 J	1400 U	2 3	110	1400 U
1,1-Dichioroethene	12 U	1400 U	110	11 U	1400 U
1,1-Dichloroethane	12 U	1400 U	11 U	11 U ::	1400 U
1,2-Dtchloroethene (total)	12 U	1400 U	11)U	11 0	1400 U
Chloroform	12 U	1400 U	11 U :	11 U	1400 U
1,2-Dichloroethane	12 U	1400 U	11/U	11 U	1400 U
2-Butanone	12 U	1400 U	11 UB	11 U	7400 J
1,1,1-Trichloroethane	12 U	1400 U	11 U	11 U	1400 U
Carbon Te <b>irachloride</b>	12 U	1400 U	11 U	11 U	1400 U
Bromodichioromethane [	12 U	1400 U	11 U.	11 U	1400 U
1,2-Dichloropropane	12 U	1400(U	11(U	11 U: 5	1400 U
cls-1,3-Dichloropropene	12 0	1400 U	11 U .	110	1400 U.
Trichloroethene	12 U	1400 U .	11 U	11 U 3	1400 U
Dibromochloromethane [	12 U ·	1400 U	11 0	110 9 9	1400 U
1,1,2-Trichloroethane	12 U	1400 U	11 U, 64	11 U	1400 U
Benzene	12 U_	<b>★</b> 1500 ′ ★.:	110	11 U ···	1400 U
trans-1,3-Dichloropropene	12 U' 🚉	1400 U	11 U ·	11 0 :	1400 U
Bromoform	12 U	1400 U	110	11 U	1400 U
4-Methyl-2-Pentanone	12 U	1400 U ,	11 (), ,	11 U	1400 U
2-Hexanone	12 U	1400 U	11 U.	11 U	1400 U
Tetrachloroethene	12 U	1400 U	110	130	250 J
1,1,2,2-Tetrachioroethane	12 U	1400 U :-	11 U ,	11 U ' .	1400 U
Toluene	12 U : "	1400000 D	12	11 U -	1400 U
Chlorobenzene	12 U: /²	1400 U	11/0	11 U	1400 U
Ethylbenzene		★ 690000 D	2 J	11 U	1400 U
Styrene	12 U	1400 U	11 U ·	11 0	1400 U
Xylene [	12 U	2300000 D	23	11/0.2	180 J

# APPENDIX C.2 SOURCE AREA REINJECTION RATE CALCULATION

Keinjection Rates

△h = 2.39 \* log (2.25kbt) + = 52%000

9 = pump rate

K = hydraulic Conductivity

b = aguifes thickness

Tw = effective well radius

S = Storage coefficient Typically = 2.1

AREA 4 - No

Dh = draw lown

= 2.3 (Sgol/mir) log (2.25 (2.4x.0-3 //min) (33+1) 52560 4 17 (2.4 x10-3 (1/min) (33+1)

= 1.54 · (7.56 + 7.56 + 7.56 + 7.56) = 46.5ft 35fee

1 Store

AREA 9/10

75% Back

 $= \frac{(2.3)(19)^{min}}{4\pi(24x10^{-3})(100ft)} \cdot log \left[\frac{2.25(2.4x.0^{-3})(100)(525600)}{(.16)^{2}(.1)}\right]$ 

.1.0 X 8.04

= 0.10 x (8,04 x 50)

= 40.2 ft

6WE 30-35ft

80% Back



PROJECT Kackford FFS
DETAIL KRINJECTION KATES

JOB NO. 1/8/-23%/
DATE CHECKED 9 3-78
CHECKED BY

PAGE 2/2

DATE 8/4/98

APUTED BY BES

AREA II - 1 3

= (2.3)(4.5)
HTP (2.4×10-3)(100ft) · log (2.25(2.4×10-3)(100)(525600))

0.46

= 33.3ft

6WB 30 feet

90% Bork

505796

## APPENDIX C.3 WHPA MODEL CALCULATIONS

## AREA 4

-Transmissivity (ft2/day)

- Aguilar Thickness (feet)

- Aguifer Porosity (demensionless)

0.25 -> ~ general for sand/grave/

- Hydraulic Gradient (demensionless)

Distance between flow lines = 660 feet

Change in groundwater level = 5 feet

$$=\frac{5}{660}=0.008$$

-Angle of Ambient Flow (degrees)

- Pumping Rate (ft /doy)

JOB NO. /62/ - 23%/
DATE CHECKED 2.4.18
CHECKED BY 248 \_\_\_\_\_\_ CO

PAGE 2/4/78
DATE 77/78

## WHPA MODELTNG

AREA 7

Depth to Bedrock varies from 35 feet on the valley flank to >135 feet in the valley center.

6W Flow is to the northwest Localised is to the creek

6W ranges from 36 feet south of Park to 13 feet within park to less than 2 feet near creek

TRANS MISSIVITY

T= K.b

K = hydraulie Conductivity b = Saturated Thickness

T= 4.00 10 5 ft/sec

6w@ 2-36 feet bgs.

35 7135 in Volley Bedrock

135 - 13 = 122 feet Saturated thickness

20-13 = 7 feet satural

 $(4.0 \times 10^{-5})(7) \times \frac{60}{1} \times \frac{60}{1} \times \frac{24}{1} = 24.192$ 

°17+270 = 287°

450 - [.022]

## AREA 9/10

$$=\frac{4}{2000'}=0.002$$

200

- Pumping Rate (ft 3 day)

## HREA 11

- Transmissivity (ft2/day)

k = hydraulic gradient b = saturated thickness

K= 4×10 Sec x 60sec x 60min x 24hr

= 3.456 ft/day

T = 3.456 ft/day \*(101-32') = 238.464 ft/day Similiar to Area 9

-Aguifer Thickness (feet)

101 feet

- Aquifer Porosity (demensionless)

- Hydraulic Gradient (demensionless)

Distance between flow lines = 630 feet

Change in groundwater level = 5 feet

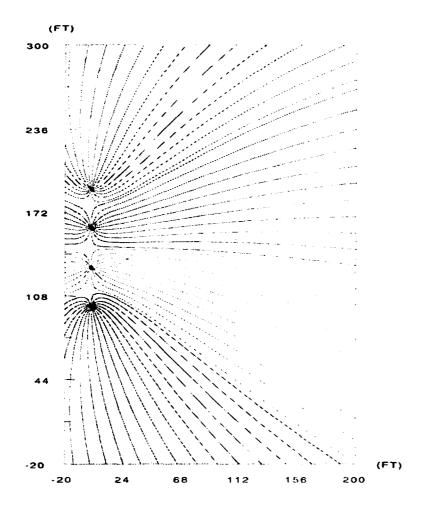
- Angle of Ambient flow (degrees)



- Pumping Rate (F13/day)

50gpm x 0.002228 = 0.1114ft3 x 60sec x 60min x 24hc 1day

Total = 9625 ft3/day /9 Well 1069 ft3/dan



#### Rockford FS - Area 4

FT AND DA SYSTEM OF UNITS IS USED

REGIONAL FLOW, PORE VELOCITY = 0.11 FT/DAY

ORIENTATION OF REGIONAL FLOW = 160.00 DEGREES

THICKNESS OF THE AQUIFER = 33.00 FEET

POROSITY = 25.00 PERCENT

PERIOD STUDIED = 365.00 DAYS

INITIAL AQUIFER CONCENTRATION = 0.000E-01

**DEFAULT INJECTION CONCENTRATION = 0.000E-01** 

STREAMLINE STEP LENGTH = 1.10 FEET

ADSORPTION CAPACITY OF ROCK = 00.00 PERCENT

NUMBER OF INJECTION WELLS = 0

NUMBER OF PUMPING WELLS = 4

#### 1 4 PRODUCTION WELLS

WELL NAME	X	Y	FLOW-	RATE	RADIUS	INDICATOR
FEET	FEET		FT3/DAY	FEET		

0.00 100.00 962.50 2.50E-01 0

0.00 130.00 962.50 2.50E-01 0

0.00 160.00 962.50 2.50E-01

0.00 190.00 962.50 2.50E-01 0

#### STREAMLINES DEPARTING FROM INJECTION WELL

## NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

1	+++NONE+++	366.3 DAYS	0.0
•	1111011011	300.3 D1110	0.0

2 +++NONE+++ 365.9 DAYS 18.0

3 +++NONE+++ 365.1 DAYS 36.0

4 +++NONE+++ 366.3 DAYS 54.0

5 +++NONE+++ 366.6 DAYS 72.0

6 +++NONE+++ 366.1 DAYS 90.0

7 +++NONE+++ 365.8 DAYS 108.0

8 +++NONE+++ 365.4 DAYS 126.0

9 +++NONE+++ 366.2 DAYS 144.0

10 +++NONE+++ 365.7 DAYS 162.0 11 +++NONE+++ 367.3 DAYS 180.0

12 +++NONE+++ 368.1 DAYS 198.0

13 +++NONE+++ 365.1 DAYS 216.0

14 +++NONE+++ 367.8 DAYS 234.0

```
+++NONE+++ 367.0 DAYS
                               252.0
15
                               270.0
16
    +++NONE+++
                 365.7 DAYS
    +++NONE+++ 367.1 DAYS
                               288.0
17
    +++NONE+++ 365.2 DAYS
                               306.0
18
    +++NONE+++ 365.9 DAYS
                               324.0
19
20
    +++NONE+++
                 366.3 DAYS
                               342.0
```

## NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

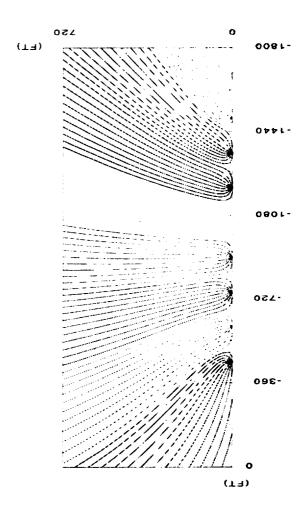
```
+++NONE+++ 366.0 DAYS
                                0.0
1
    +++NONE+++ 367.4 DAYS
                               18.0
2
3
   +++NONE+++ 365.3 DAYS
                               36.0
    +++NONE+++ 365.1 DAYS
                               54.0
    +++NONE+++ 366.5 DAYS
                               72.0
5
    +++NONE+++ 367.6 DAYS
                               90.0
7
    +++NONE+++ 367.8 DAYS
                               108.0
    +++NONE+++ 366.7 DAYS
8
                               126.0
    +++NONE+++ 366.0 DAYS
                               144.0
    +++NONE+++ 366.4 DAYS
                               162.0
10
    +++NONE+++ 368.3 DAYS
11
                               180.0
    +++NONE+++ 368.3 DAYS
                               198.0
12
    +++NONE+++ 366.8 DAYS
                               216.0
13
    +++NONE+++ 367.2 DAYS
                               234.0
14
15
    +++NONE+++ 366.1 DAYS
                               252.0
    +++NONE+++
                 365.0 DAYS
                               270.0
16
    +++NONE+++ 367.1 DAYS
17
                               288.0
    +++NONE+++ 366.0 DAYS
18
                               306.0
19
    +++NONE+++
                 366.7 DAYS
                               324.0
    +++NONE+++ 366.7 DAYS
20
                               342.0
```

#### STREAMLINES DEPARTING FROM INJECTION WELL

1	+++NONE+++	366.7 DAYS	0.0
2	+++NONE+++	366.6 DAYS	18.0
3	+++NONE+++	365.8 DAYS	36.0
4	+++NONE+++	367.0 DAYS	54.0
5	+++NONE+++	367.3 DAYS	72.0
6	+++NONE+++	366.9 DAYS	90.0
7	+++NONE+++	366.0 DAYS	108.0

8	+++NONE+++	368.1 DAYS	126.0
9	+++NONE+++	366.3 DAYS	144.0
10	+++NONE+++	365.4 DAYS	162.0
11	+++NONE+++	365.4 DAYS	180.0
12	+++NONE+++	366.5 DAYS	198.0
13	+++NONE+++	368.6 DAYS	216.0
14	+++NONE+++	367.1 DAYS	234.0
15	+++NONE+++	365.9 DAYS	252.0
16	+++NONE+++	367.3 DAYS	270.0
17	+++NONE+++	365.2 DAYS	288.0
18	+++NONE+++	365.6 DAYS	306.0
19	+++NONE+++	367.7 DAYS	324.0
20	+++NONE+++	366.2 DAYS	342.0

1	+++NONE+++	367.8 DAYS	0.0
2	+++NONE+++	367.4 DAYS	18.0
3	+++NONE+++	366.7 DAYS	36.0
4	+++NONE+++	365.7 DAYS	54.0
5	+++NONE+++	367.6 DAYS	72.0
6	+++NONE+++	365.7 DAYS	90.0
7	+++NONE+++	366.7 DAYS	108.0
8	+++NONE+++	367.1 DAYS	126.0
9	+++NONE+++	366.6 DAYS	144.0
10	+++NONE+++	368.6 DAYS	162.0
11	+++NONE+++	365.5 DAYS	180.0
12	+++NONE+++	368.2 DAYS	198.0
13	+++NONE+++	368.9 DAYS	216.0
14	+++NONE+++	366.9 DAYS	234.0
15	+++NONE+++	369.0 DAYS	252.0
16	+++NONE+++	367.6 DAYS	270.0
17	+++NONE+++	367.5 DAYS	288.0
18	+++NONE+++	366.5 DAYS	306.0
19	+++NONE+++	367.5 DAYS	324.0
20	+++NONE+++	367.9 DAYS	342.0



Plees 7

#### Southeast Rockford FS - Area 7

FT AND DA SYSTEM OF UNITS IS USED

REGIONAL FLOW, PORE VELOCITY = 0.11 FT/DAY

ORIENTATION OF REGIONAL FLOW = 153.00 DEGREES

THICKNESS OF THE AQUIFER 20.00 FEET =

POROSITY = 25.00 PERCENT

PERIOD STUDIED = 3650.00 DAYS

INITIAL AQUIFER CONCENTRATION = 0.000E-01

DEFAULT INJECTION CONCENTRATION = 0.000E-01

STREAMLINE STEP LENGTH = 9.00 FEET

ADSORPTION CAPACITY OF ROCK = 00.00 PERCENT

NUMBER OF INJECTION WELLS = 0

NUMBER OF PUMPING WELLS = 8

1

#### 8 PRODUCTION WELLS

WELL NAME FLOW-RATE RADIUS INDICATOR X Y FEET FEET FT3/DAY FEET

0.00	-450.00	1203.00	2.50E-01	0
0.00	-600.00	1203.00	2.50E-01	0
0.00	-750.00	1203.00	2.50E-01	0

0.00 -900.00 1203.00 2.50E-01 0

0.00 -1050.00 1203.00 2.50E-01 0.00 -1200.00 1203.00 2.50E-01 0

0.00 -1350.00 1203.00 2.50E-01 0

0.00 -1500.00 1203.00 2.50E-01

#### STREAMLINES DEPARTING FROM INJECTION WELL

NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

+++NONE+++ 3657.8 DAYS 1 0.0

2 +++NONE+++ 3652.0 DAYS 18.0

3 +++NONE+++ 3685.2 DAYS 36.0

+++NONE+++ 3677.9 DAYS 54.0

5 +++NONE+++ 3668.7 DAYS 72.0 +++NONE+++ 3656.7 DAYS

90.0 7 +++NONE+++ 3683.2 DAYS 108.0

8 +++NONE+++ 3663.2 DAYS 126.0

9 +++NONE+++ 3680.5 DAYS 144.0

10 +++NONE+++ 3691.5 DAYS 162.0

```
+++NONE+++ 3694.1 DAYS
                                180.0
11
    +++NONE+++ 3687.2 DAYS
                                198.0
12
    +++NONE+++ 3668.5 DAYS
                                216.0
13
    +++NONE+++ 3683.2 DAYS
                                234.0
14
    +++NONE+++ 3681.8 DAYS
                                252.0
15
    +++NONE+++ 3678.4 DAYS
                                270.0
16
    +++NONE+++ 3672.9 DAYS
                                288.0
17
18
    +++NONE+++ 3671.5 DAYS
                                306.0
    +++NONE+++ 3668.2 DAYS
                                324.0
19
    +++NONE+++ 3663.5 DAYS
                                342.0
20
```

## NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

```
+++NONE+++ 3673.1 DAYS
                                0.0
1
    +++NONE+++ 3675.3 DAYS
                                18.0
   +++NONE+++ 3673.6 DAYS
                                36.0
   +++NONE+++ 3667.3 DAYS
                                54.0
    +++NONE+++ 3656.3 DAYS
                                72.0
    +++NONE+++ 3680.2 DAYS
                                90.0
    +++NONE+++ 3698.9 DAYS
                               108.0
7
    +++NONE+++ 3697.7 DAYS
                               126.0
    +++NONE+++ 3688.9 DAYS
                               144.0
   +++NONE+++ 3664.0 DAYS
10
                                162.0
    +++NONE+++ 3674.7 DAYS
                                180.0
11
    +++NONE+++ 3665.8 DAYS
                                198.0
12
13
    +++NONE+++ 3691.1 DAYS
                                216.0
    +++NONE+++ 3691.1 DAYS
                                234.0
14
15
    +++NONE+++ 3661.5 DAYS
                                252.0
    +++NONE+++ 3656.0 DAYS
16
                                270.0
17
    +++NONE+++ 3664.8 DAYS
                                288.0
18
    +++NONE+++ 3680.1 DAYS
                                306.0
19
    +++NONE+++ 3658.2 DAYS
                                324.0
    +++NONE+++ 3667.3 DAYS
20
                                342.0
```

#### STREAMLINES DEPARTING FROM INJECTION WELL

## NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

1 +++NONE+++ 3676.1 DAYS 0.0 2 +++NONE+++ 3663.1 DAYS 18.0 3 +++NONE+++ 3678.3 DAYS 36.0

4	+++NONE+++ 3655.5 DAYS	54.0
5	+++NONE+++ 3661.3 DAYS	72.0
6	+++NONE+++ 3669.1 DAYS	90.0
7	+++NONE+++ 3653.9 DAYS	108.0
8	+++NONE+++ 3683.9 DAYS	126.0
9	+++NONE+++ 3689.4 DAYS	144.0
10	+++NONE+++ 3666.9 DAYS	162.0
11	+++NONE+++ 3678.9 DAYS	180.0
12	+++NONE+++ 3664.4 DAYS	198.0
13	+++NONE+++ 3685.2 DAYS	216.0
14	+++NONE+++ 3679.1 DAYS	234.0
15	+++NONE+++ 3706.8 DAYS	252.0
16	+++NONE+++ 3658.4 DAYS	270.0
17	+++NONE+++ 3654.1 DAYS	288.0
18	+++NONE+++ 3656.8 DAYS	306.0
19	+++NONE+++ 3656.4 DAYS	324.0
20	+++NONE+++ 3652.0 DAYS	342.0

**ANGLE BETA** 

288.0 306.0

324.0

342.0

NUMBER OF WELL TIME OF

17

18 19

20

1101			2 11 11	
STRE	EAMLINE REAC	CHED ARRI	VAL	IN DEGREES
1	+++NONE+++	3676.4 DAYS	0.0	
2	+++NONE+++	3654.2 DAYS	18.0	
3	+++NONE+++	3658.9 DAYS	36.0	
4	+++NONE+++	3658.8 DAYS	54.0	
5	+++NONE+++	3654.9 DAYS	72.0	
6	+++NONE+++	3655.6 DAYS	90.0	
7	+++NONE+++	3683.1 DAYS	108.0	)
8	+++NONE+++	3650.1 DAYS	126.0	)
9	+++NONE+++	3650.5 DAYS	144.0	)
10	+++NONE+++	3682.8 DAYS	162.	0
11	+++NONE+++	3693.1 DAYS	180.	0
12	+++NONE+++	3684.0 DAYS	198.	0
13	+++NONE+++	3658.0 DAYS	216.	0
14	+++NONE+++	3668.0 DAYS	234.	0
15	+++NONE+++	3668.5 DAYS	252.	0
16	+++NONE+++	3670.7 DAYS	270.	0

STREAMLINES DEPARTING FROM INJECTION WELL

+++NONE+++ 3658.7 DAYS

+++NONE+++ 3653.0 DAYS

+++NONE+++ 3675.5 DAYS

+++NONE+++ 3662.4 DAYS

# NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES 1 +++NONE+++ 3671.5 DAYS 0.0

1	+++NONE+++ 36/1.5 DAYS	0.0
2	+++NONE+++ 3672.6 DAYS	18.0
3	+++NONE+++ 3669.1 DAYS	36.0
4	+++NONE+++ 3661.2 DAYS	54.0
5	+++NONE+++ 3680.9 DAYS	72.0
6	+++NONE+++ 3675.6 DAYS	90.0
7	+++NONE+++ 3687.5 DAYS	108.0
8	+++NONE+++ 3668.4 DAYS	126.0
9	+++NONE+++ 3683.3 DAYS	144.0
10	+++NONE+++ 3682.5 DAYS	162.0
11	+++NONE+++ 3668.2 DAYS	180.0
12	+++NONE+++ 3686.3 DAYS	198.0
13	+++NONE+++ 3650.5 DAYS	216.0
14	+++NONE+++ 3691.2 DAYS	234.0
15	+++NONE+++ 3650.5 DAYS	252.0
16	+++NONE+++ 3672.4 DAYS	270.0
17	+++NONE+++ 3654.5 DAYS	288.0
18	+++NONE+++ 3672.4 DAYS	306.0
19	+++NONE+++ 3655.6 DAYS	324.0
20	+++NONE+++ 3665.8 DAYS	342.0

#### STREAMLINES DEPARTING FROM INJECTION WELL

1	+++NONE+++	3660.9 DAYS	0.0
2	+++NONE+++	3652.8 DAYS	18.0
3	+++NONE+++	3672.0 DAYS	36.0
4	+++NONE+++	3655.4 DAYS	54.0
5	+++NONE+++	3666.9 DAYS	72.0
6	+++NONE+++	3653.8 DAYS	90.0
7	+++NONE+++	3663.2 DAYS	108.0
8	+++NONE+++	3675.4 DAYS	126.0
9	+++NONE+++	3682.4 DAYS	144.0
10	+++NONE+++	3680.0 DAYS	162.0
11	+++NONE+++	3669.2 DAYS	180.0
12	+++NONE+++	3651.4 DAYS	198.0
13	+++NONE+++	3665.5 DAYS	216.0
14	+++NONE+++	3674.6 DAYS	234.0
15	+++NONE+++	3653.2 DAYS	252.0
16	+++NONE+++	3674.9 DAYS	270.0

```
17 +++NONE+++ 3681.7 DAYS 288.0

18 +++NONE+++ 3658.8 DAYS 306.0

19 +++NONE+++ 3663.9 DAYS 324.0

20 +++NONE+++ 3664.6 DAYS 342.0
```

## NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

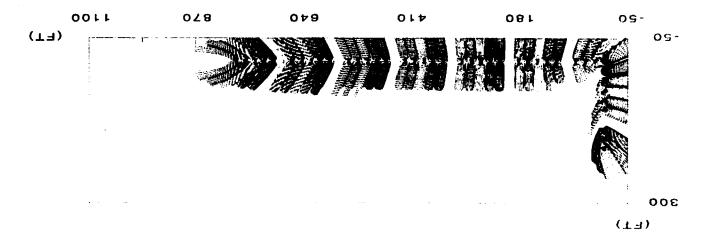
1	+++NONE+++	3670.9 DAYS	0.0
2	+++NONE+++	3650.2 DAYS	18.0
3	+++NONE+++	3658.6 DAYS	36.0
4	+++NONE+++	3663.1 DAYS	54.0
5	+++NONE+++	3664.1 DAYS	72.0
6	+++NONE+++	3671.2 DAYS	90.0
7	+++NONE+++	3682.9 DAYS	108.0
8	+++NONE+++	3671.3 DAYS	126.0
9	+++NONE+++	3657.2 DAYS	144.0
10	+++NONE+++	3673.5 DAYS	162.0
11	+++NONE+++	3683.7 DAYS	180.0
12	+++NONE+++	3652.2 DAYS	198.0
13	+++NONE+++	3652.5 DAYS	216.0
14	+++NONE+++	3685.3 DAYS	234.0
15	+++NONE+++	3652.3 DAYS	252.0
16	+++NONE+++	3653.3 DAYS	270.0
17	+++NONE+++	3682.1 DAYS	288.0
18	+++NONE+++	3677.1 DAYS	306.0
19	+++NONE+++	3668.1 DAYS	324.0
20	+++NONE+++	3655.0 DAYS	342.0

#### STREAMLINES DEPARTING FROM INJECTION WELL

```
+++NONE+++ 3657.3 DAYS
                                0.0
1
   +++NONE+++ 3653.3 DAYS
2
                               18.0
3
   +++NONE+++ 3681.2 DAYS
                               36.0
4
   +++NONE+++ 3672.2 DAYS
                               54.0
   +++NONE+++ 3660.5 DAYS
                               72.0
6
   +++NONE+++ 3653.1 DAYS
                               90.0
7
   +++NONE+++ 3661.4 DAYS
                               108.0
   +++NONE+++ 3674.7 DAYS
                              126.0
   +++NONE+++ 3683.5 DAYS
                              144.0
```

10	+++NONE+++	3650.7 DAYS	162.0
11	+++NONE+++	3684.3 DAYS	180.0
12	+++NONE+++	3677.2 DAYS	198.0
13	+++NONE+++	3665.7 DAYS	216.0
14	+++NONE+++	3685.4 DAYS	234.0
15	+++NONE+++	3665.6 DAYS	252.0
16	+++NONE+++	3677.5 DAYS	270.0
17	+++NONE+++	3650.9 DAYS	288.0
18	+++NONE+++	3656.4 DAYS	306.0
19	+++NONE+++	3659.0 DAYS	324.0
20	<b>TTTNONETTT</b>	3650 2 DAYS	342 0

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lyen 50 wells 50 ypm

#### Rockford FS - Area 9/10

FT AND DA SYSTEM OF UNITS IS USED

REGIONAL FLOW, PORE VELOCITY = 0.02 FT/DAY

ORIENTATION OF REGIONAL FLOW = 200.00 DEGREES

THICKNESS OF THE AQUIFER = 101.00 FEET

POROSITY = 25.00 PERCENT

PERIOD STUDIED = 365.00 DAYS

INITIAL AQUIFER CONCENTRATION = 0.000E-01

**DEFAULT INJECTION CONCENTRATION = 0.000E-01** 

STREAMLINE STEP LENGTH = 5.70 FEET

ADSORPTION CAPACITY OF ROCK = 00.00 PERCENT

NUMBER OF INJECTION WELLS = 0

NUMBER OF PUMPING WELLS = 50

#### 1 50 PRODUCTION WELLS

WELL NAM	ME	X Y	FLOW-	RATE	<b>RADIUS</b>	INDICATOR
FE	ET	FEET	FT3/DAY	FEET		
0.00	0.00	192.50	2.50E-01	0		
20.00	0.00	192.50	2.50E-01	0		
40.00	0.00	192.50	2.50E-01	0		
60.00	0.00	192.50	2.50E-01	0		
80.00	0.00	192.50	2.50E-01	0		
100.00	0.00	192.50	2.50E-01	0		
120.00	0.00	192.50	2.50E-01	0		
140.00	0.00	192.50	2.50E-01	0		
160.00	0.00	192.50	2.50E-01	0		
180.00	0.00	192.50	2.50E-01	0		
200.00	0.00	192.50	2.50E-01	0		
220.00	0.00	192.50	2.50E-01	0		
240.00	0.00	192.50	2.50E-01	0		
260.00	0.00	192.50	2.50E-01	0		
280.00	0.00	192.50	2.50E-01	0		
300.00	0.00	192.50	2.50E-01	0		
320.00	0.00	192.50	2.50E-01	0		
340.00	0.00	192.50	2.50E-01	0		
360.00	0.00	192.50	2.50E-01	0		
380.00	0.00	192.50	2.50E-01	0		
400.00	0.00	192.50	2.50E-01	0		
420.00	0.00	192.50	2.50E-01	0		
440.00	0.00	192.50	2.50E-01	0		
460.00	0.00	192.50	2.50E-01	0		

480.00	0.00	192.50	2.50E-01	0
500.00	0.00	192.50	2.50E-01	0
520.00	0.00	192.50	2.50E-01	0
540.00	0.00	192.50	2.50E-01	0
560.00	0.00	192.50	2.50E-01	0
580.00	0.00	192.50	2.50E-01	0
600.00	0.00	192.50	2.50E-01	0
620.00	0.00	192.50	2.50E-01	0
640.00	0.00	192.50	2.50E-01	0
660.00	0.00	192.50	2.50E-01	0
680.00	0.00	192.50	2.50E-01	0
700.00	0.00	192.50	2.50E-01	0
720.00	0.00	192.50	2.50E-01	0
740.00	0.00	192.50	2.50E-01	0
760.00	0.00	192.50	2.50E-01	0
780.00	0.00	192.50	2.50E-01	0
800.00	0.00	192.50	2.50E-01	0
0.00	30.00	192.50	2.50E-01	0
0.00	50.00	192.50	2.50E-01	0
0.00	70.00	192.50	2.50E-01	0
0.00	90.00	192.50	2.50E-01	0
0.00	110.00	192.50	2.50E-01	0
0.00	130.00	192.50	2.50E-01	0
0.00	150.00	192.50	2.50E-01	0
0.00	170.00	192.50	2.50E-01	0
0.00	190.00	192.50	2.50E-01	0

NUMBER OF	WELL	TIME OF	ANGLE BETA
STREAMLINE	REACHED	ARRIVAL	IN DEGREES

1	+++NONE+++	389.2 DAYS	0.0
2	+++NONE+++	389.4 DAYS	18.0
3	+++NONE+++	384.4 DAYS	36.0
4	+++NONE+++	387.6 DAYS	54.0
5	+++NONE+++	374.5 DAYS	72.0
6	+++NONE+++	368.3 DAYS	90.0
7	+++NONE+++	366.1 DAYS	108.0
8	+++NONE+++	366.1 DAYS	126.0
9	+++NONE+++	367.5 DAYS	144.0
10	+++NONE+++	369.4 DAYS	162.0
11	+++NONE+++	371.4 DAYS	180.0
12	+++NONE+++	373.0 DAYS	198.0
13	+++NONE+++	374.1 DAYS	216.0

```
+++NONE+++ 374.5 DAYS
                             234.0
14
                             252.0
   +++NONE+++ 374.3 DAYS
15
                             270.0
    +++NONE+++ 373.5 DAYS
16
                             288.0
17
   +++NONE+++ 372.6 DAYS
   +++NONE+++ 372.0 DAYS
                             306.0
18
                             324.0
19
   +++NONE+++ 372.7 DAYS
    +++NONE+++ 376.8 DAYS
                             342.0
20
```

## NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

1	+++NONE+++	380.6 DAYS	0.0
2	+++NONE+++	368.6 DAYS	18.0
3	+++NONE+++	381.6 DAYS	36.0
4	+++NONE+++	382.3 DAYS	54.0
5	+++NONE+++	368.7 DAYS	72.0
6	+++NONE+++	371.2 DAYS	90.0
7	+++NONE+++	383.6 DAYS	108.0
8	+++NONE+++	377.1 DAYS	126.0
9	+++NONE+++	366.8 DAYS	144.0
10	+++NONE+++	390.8 DAYS	162.0
11	+++NONE+++	387.8 DAYS	180.0
12	+++NONE+++	387.7 DAYS	198.0
13	+++NONE+++	389.1 DAYS	216.0
14	+++NONE+++	390.9 DAYS	234.0
15	+++NONE+++	392.8 DAYS	252.0
16	+++NONE+++	394.5 DAYS	270.0
17	+++NONE+++	366.1 DAYS	288.0
18	+++NONE+++	368.4 DAYS	306.0
19	+++NONE+++	372.7 DAYS	324.0
20	+++NONE+++	382.3 DAYS	342.0

#### STREAMLINES DEPARTING FROM INJECTION WELL

1	+++NONE+++	377.4 DAYS	0.0
2	+++NONE+++	378.1 DAYS	18.0
3	+++NONE+++	367.9 DAYS	36.0
4	+++NONE+++	430.9 DAYS	54.0
5	+++NONE+++	426.3 DAYS	72.0
6	+++NONE+++	383.2 DAYS	90.0

```
7
                 365.3 DAYS
                               108.0
    +++NONE+++
8
    +++NONE+++
                 366.0 DAYS
                               126.0
9
    +++NONE+++
                 367.8 DAYS
                               144.0
                  385.3 DAYS
                                162.0
10
    +++NONE+++
    +++NONE+++ 372.3 DAYS
                                180.0
11
12
    +++NONE+++
                  368.0 DAYS
                                198.0
13
    +++NONE+++
                  367.3 DAYS
                                216.0
    +++NONE+++ 368.4 DAYS
14
                                234.0
    +++NONE+++ 370.5 DAYS
                                252.0
15
16
    +++NONE+++
                  373.0 DAYS
                                270.0
                                288.0
17
    +++NONE+++ 376.0 DAYS
18
    +++NONE+++ 380.0 DAYS
                                306.0
19
    +++NONE+++
                  386.5 DAYS
                                324.0
20
    +++NONE+++ 371.6 DAYS
                                342.0
```

## NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

```
1
    +++NONE+++ 383.1 DAYS
                                0.0
2
    +++NONE+++
                 377.9 DAYS
                                18.0
3
    +++NONE+++ 411.1 DAYS
                                36.0
4
    +++NONE+++
                 392.1 DAYS
                                54.0
5
    +++NONE+++
                 390.4 DAYS
                                72.0
                 398.0 DAYS
                                90.0
6
    +++NONE+++
7
    +++NONE+++ 411.2 DAYS
                               108.0
8
    +++NONE+++
                 426.5 DAYS
                               126.0
9
    +++NONE+++
                 440.0 DAYS
                               144.0
10
    +++NONE+++ 372.2 DAYS
                                162.0
    +++NONE+++ 367.8 DAYS
11
                                180.0
12
    +++NONE+++ 386.9 DAYS
                                198.0
13
    +++NONE+++ 383.8 DAYS
                                216.0
    +++NONE+++
                  383.6 DAYS
14
                                234.0
15
    +++NONE+++ 385.1 DAYS
                                252.0
    +++NONE+++ 387.6 DAYS
16
                                270.0
17
    +++NONE+++
                  391.0 DAYS
                                288.0
18
    +++NONE+++
                  367.1 DAYS
                                306.0
19
    +++NONE+++ 375.0 DAYS
                                324.0
20
    +++NONE+++ 390.5 DAYS
                                342.0
```

#### STREAMLINES DEPARTING FROM INJECTION WELL

1	+++NONE+++	378.3 DAYS	0.0
2	+++NONE+++	390.1 DAYS	18.0
3	+++NONE+++	402.3 DAYS	36.0
4	+++NONE+++	385.9 DAYS	54.0
5	+++NONE+++	381.8 DAYS	72.0
6	+++NONE+++	384.6 DAYS	90.0
7	+++NONE+++	391.9 DAYS	108.0
8	+++NONE+++	403.0 DAYS	126.0
9	+++NONE+++	418.4 DAYS	144.0
10	+++NONE+++	400.7 DAYS	162.0
11	+++NONE+++	378.2 DAYS	180.0
12	+++NONE+++	378.5 DAYS	198.0
13	+++NONE+++	372.9 DAYS	216.0
14	+++NONE+++	371.3 DAYS	234.0
15	+++NONE+++	371.8 DAYS	252.0
16	+++NONE+++	373.8 DAYS	270.0
17	+++NONE+++	377.1 DAYS	288.0
18	+++NONE+++	382.2 DAYS	306.0
19	+++NONE+++	390.8 DAYS	324.0
20	+++NONE+++	379.0 DAYS	342.0

<b>NUMBER OF</b>	WELL	TIME OF	ANGLE BETA
STREAMLINE	REACHED	ARRIVAL	IN DEGREES

1	+++NONE+++	391.8 DAYS	0.0
2	+++NONE+++	382.3 DAYS	18.0
3	+++NONE+++	366.2 DAYS	36.0
4	+++NONE+++	394.2 DAYS	54.0
5	+++NONE+++	389.6 DAYS	72.0
6	+++NONE+++	390.7 DAYS	90.0
7	+++NONE+++	395.9 DAYS	108.0
8	+++NONE+++	404.9 DAYS	126.0
9	+++NONE+++	372.3 DAYS	144.0
10	+++NONE+++	400.2 DAYS	162.0
11	+++NONE+++	372.1 DAYS	180.0
12	+++NONE+++	368.0 DAYS	198.0
13	+++NONE+++	389.0 DAYS	216.0
14	+++NONE+++	386.1 DAYS	234.0
15	+++NONE+++	385.9 DAYS	252.0
16	+++NONE+++	387.5 DAYS	270.0
17	+++NONE+++	390.6 DAYS	288.0
18	+++NONE+++	366.6 DAYS	306.0
19	+++NONE+++	375.6 DAYS	324.0

```
20 +++NONE+++ 392.9 DAYS 342.0
```

## NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

```
+++NONE+++ 375.1 DAYS
                                0.0
1
2
    +++NONE+++
                 395.2 DAYS
                               18.0
                               36.0
3
                 383.0 DAYS
    +++NONE+++
4
    +++NONE+++ 369.5 DAYS
                               54.0
5
    +++NONE+++ 404.9 DAYS
                               72.0
6
    +++NONE+++ 405.3 DAYS
                               90.0
7
    +++NONE+++ 368.2 DAYS
                               108.0
    +++NONE+++ 375.6 DAYS
                               126.0
8
9
    +++NONE+++
                 388.2 DAYS
                               144.0
    +++NONE+++ 377.2 DAYS
                               162.0
10
    +++NONE+++ 390.8 DAYS
                               180.0
11
    +++NONE+++ 383.2 DAYS
                               198.0
12
13
    +++NONE+++ 373.8 DAYS
                               216.0
14
    +++NONE+++ 369.7 DAYS
                               234.0
    +++NONE+++ 368.7 DAYS
                               252.0
15
    +++NONE+++ 369.8 DAYS
                               270.0
16
    +++NONE+++ 372.6 DAYS
                               288.0
17
                               306.0
18
    +++NONE+++ 377.7 DAYS
19
    +++NONE+++ 386.9 DAYS
                               324.0
    +++NONE+++ 375.2 DAYS
20
                               342.0
```

#### STREAMLINES DEPARTING FROM INJECTION WELL

1	+++NONE+++	377.3 DAYS	0.0
2	+++NONE+++	375.4 DAYS	18.0
3	+++NONE+++	365.5 DAYS	36.0
4	+++NONE+++	390.9 DAYS	54.0
5	+++NONE+++	386.1 DAYS	72.0
6	+++NONE+++	385.8 DAYS	90.0
7	+++NONE+++	389.1 DAYS	108.0
8	+++NONE+++	395.9 DAYS	126.0
9	+++NONE+++	368.9 DAYS	144.0
10	+++NONE+++	376.1 DAYS	162.0
11	+++NONE+++	378.8 DAYS	180.0
12	+++NONE+++	366.9 DAYS	198.0

```
13
    +++NONE+++ 385.4 DAYS
                             216.0
                             234.0
    +++NONE+++ 380.4 DAYS
14
    +++NONE+++ 378.8 DAYS
                             252.0
15
    +++NONE+++ 379.5 DAYS
                             270.0
16
    +++NONE+++ 382.1 DAYS
                             288.0
17
    +++NONE+++ 387.2 DAYS
18
                             306.0
    +++NONE+++ 366.5 DAYS
                             324.0
19
20 +++NONE+++ 384.2 DAYS
                             342.0
```

## NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

1	+++NONE+++	385.8 DAYS	0.0
2	+++NONE+++	397.1 DAYS	18.0
3	+++NONE+++	389.2 DAYS	36.0
4	+++NONE+++	377.6 DAYS	54.0
5	+++NONE+++	372.9 DAYS	72.0
6	+++NONE+++	372.3 DAYS	90.0
7	+++NONE+++	375.0 DAYS	108.0
8	+++NONE+++	381.4 DAYS	126.0
9	+++NONE+++	393.0 DAYS	144.0
10	+++NONE+++	399.5 DAYS	162.0
11	+++NONE+++	379.8 DAYS	180.0
12	+++NONE+++	377.7 DAYS	198.0
13	+++NONE+++	365.2 DAYS	216.0
14	+++NONE+++	389.6 DAYS	234.0
15	+++NONE+++	387.4 DAYS	252.0
16	+++NONE+++	387.8 DAYS	270.0
17	+++NONE+++	390.1 DAYS	288.0
18	+++NONE+++	395.1 DAYS	306.0
19	+++NONE+++	373.9 DAYS	324.0
20	+++NONE+++	391.5 DAYS	342.0

#### STREAMLINES DEPARTING FROM INJECTION WELL

1	+++NONE+++	393.2 DAYS	0.0
2	+++NONE+++	385.3 DAYS	18.0
3	+++NONE+++	378.7 DAYS	36.0
4	+++NONE+++	367.7 DAYS	54.0
5	+++NONE+++	398.8 DAYS	72.0

6	+++NONE+++	398.3 DAYS	90.0
7	+++NONE+++	400.9 DAYS	108.0
8	+++NONE+++	370.9 DAYS	126.0
9	+++NONE+++	382.3 DAYS	144.0
10	+++NONE+++	388.3 DAYS	162.0
11	+++NONE+++	393.0 DAYS	180.0
12	+++NONE+++	386.8 DAYS	198.0
13	+++NONE+++	373.2 DAYS	216.0
14	+++NONE+++	366.5 DAYS	234.0
15	+++NONE+++	394.7 DAYS	252.0
16	+++NONE+++	394.7 DAYS	270.0
17	+++NONE+++	365.9 DAYS	288.0
18	+++NONE+++	370.7 DAYS	306.0
19	+++NONE+++	379.9 DAYS	324.0
20	+++NONE+++	366.9 DAYS	342.0

NUMBER OF	WELL	TIME OF	ANGLE BETA
STREAMLINE	<b>REACHED</b>	ARRIVAL	IN DEGREES

1	+++NONE+++	386.1 DAYS	0.0
2	+++NONE+++	376.0 DAYS	18.0
3	+++NONE+++	370.4 DAYS	36.0
4	+++NONE+++	394.9 DAYS	54.0
5	+++NONE+++	390.5 DAYS	72.0
6	+++NONE+++	389.8 DAYS	90.0
7	+++NONE+++	392.3 DAYS	108.0
8	+++NONE+++	398.2 DAYS	126.0
9	+++NONE+++	374.3 DAYS	144.0
10	+++NONE+++	380.1 DAYS	162.0
11	+++NONE+++	374.9 DAYS	180.0
12	+++NONE+++	394.7 DAYS	198.0
13	+++NONE+++	379.9 DAYS	216.0
14	+++NONE+++	372.6 DAYS	234.0
15	+++NONE+++	369.5 DAYS	252.0
16	+++NONE+++	369.1 DAYS	270.0
17	+++NONE+++	371.0 DAYS	288.0
18	+++NONE+++	375.7 DAYS	306.0
19	+++NONE+++	384.8 DAYS	324.0
20	+++NONE+++	371.1 DAYS	342.0

#### STREAMLINES DEPARTING FROM INJECTION WELL

NUMBER OF WELL TIME OF ANGLE BETA

```
ARRIVAL
                                     IN DEGREES
STREAMLINE REACHED
     +++NONE+++ 371.4 DAYS
                                 0.0
  1
     +++NONE+++ 368.4 DAYS
                                18.0
  2
     +++NONE+++ 397.9 DAYS
                                36.0
 3
     +++NONE+++ 388.1 DAYS
  4
                                54.0
                                72.0
     +++NONE+++ 383.8 DAYS
  5
     +++NONE+++ 383.1 DAYS
                                90.0
 6
     +++NONE+++ 385.5 DAYS
                                108.0
 7
                                126.0
 8
     +++NONE+++ 391.3 DAYS
     +++NONE+++ 368.1 DAYS
                                144.0
 9
      +++NONE+++ 373.9 DAYS
                                162.0
 10
      +++NONE+++ 394.3 DAYS
                                180.0
 11
      +++NONE+++ 370.6 DAYS
                                198.0
 12
                   385.5 DAYS
                                216.0
 13
      +++NONE+++
                                234.0
      +++NONE+++ 377.6 DAYS
 14
      +++NONE+++ 374.2 DAYS
                                252.0
 15
      +++NONE+++
                   373.5 DAYS
                                270.0
 16
      +++NONE+++ 375.2 DAYS
                                288.0
 17
                   379.8 DAYS
                                306.0
 18
      +++NONE+++
      +++NONE+++
                   388.6 DAYS
                                324.0
 19
 20
      +++NONE+++ 374.4 DAYS
                                342.0
STREAMLINES DEPARTING FROM INJECTION WELL
NUMBER OF WELL
                      TIME OF
                                 ANGLE BETA
STREAMLINE REACHED
                         ARRIVAL
                                    IN DEGREES
 1
     +++NONE+++ 377.5 DAYS
                                0.0
                  395.5 DAYS
 2
     +++NONE+++
                                18.0
 3
     +++NONE+++ 391.8 DAYS
                                36.0
 4
     +++NONE+++ 382.4 DAYS
                                54.0
 5
     +++NONE+++ 378.3 DAYS
                                72.0
 6
     +++NONE+++ 377.7 DAYS
                                90.0
 7
     +++NONE+++ 380.0 DAYS
                                108.0
 8
     +++NONE+++ 385.8 DAYS
                                126.0
 9
     +++NONE+++ 397.1 DAYS
                                144.0
 10
     +++NONE+++ 369.0 DAYS
                                162.0
 11
     +++NONE+++ 374.2 DAYS
                                180.0
 12
     +++NONE+++ 376.0 DAYS
                                198.0
 13
     +++NONE+++ 390.2 DAYS
                                216.0
 14
     +++NONE+++ 381.8 DAYS
                                234.0
 15
     +++NONE+++
                  378.0 DAYS
                                252.0
 16
     +++NONE+++ 377.1 DAYS
                                270.0
 17
     +++NONE+++ 378.6 DAYS
```

288.0

```
18
      +++NONE+++ 382.9 DAYS
                                306.0
 19
      +++NONE+++
                   391.6 DAYS
                                324.0
 20
      +++NONE+++ 376.8 DAYS
                                342.0
STREAMLINES DEPARTING FROM INJECTION WELL
                                 ANGLE BETA
NUMBER OF
             WELL
                      TIME OF
STREAMLINE REACHED
                         ARRIVAL
                                    IN DEGREES
     +++NONE+++ 383.9 DAYS
                                 0.0
  1
     +++NONE+++
                  389.6 DAYS
                                18.0
  2
                  386.6 DAYS
                                36.0
  3
     +++NONE+++
  4
     +++NONE+++ 377.6 DAYS
                                54.0
  5
     +++NONE+++
                  373.7 DAYS
                                72.0
  6
     +++NONE+++ 373.1 DAYS
                                90.0
  7
     +++NONE+++ 375.4 DAYS
                                108.0
 8
     +++NONE+++
                  381.2 DAYS
                                126.0
 9
     +++NONE+++ 392.6 DAYS
                                144.0
 10
      +++NONE+++ 365.1 DAYS
                                162.0
 11
      +++NONE+++ 383.4 DAYS
                                180.0
      +++NONE+++
                   380.7 DAYS
                                198.0
 12
 13
      +++NONE+++ 394.1 DAYS
                                216.0
 14
      +++NONE+++ 385.1 DAYS
                                234.0
 15
      +++NONE+++
                   381.0 DAYS
                                252.0
 16
      +++NONE+++ 379.9 DAYS
                                270.0
 17
      +++NONE+++
                  381.2 DAYS
                                288.0
 18
      +++NONE+++
                   385.4 DAYS
                                306.0
 19
      +++NONE+++ 393.8 DAYS
                                324.0
 20
      +++NONE+++ 378.5 DAYS
                                342.0
STREAMLINES DEPARTING FROM INJECTION WELL
NUMBER OF WELL
                      TIME OF
                                 ANGLE BETA
STREAMLINE REACHED
                        ARRIVAL
                                    IN DEGREES
 1
     +++NONE+++
                  367.2 DAYS
                                0.0
 2
     +++NONE+++ 384.3 DAYS
                                18.0
 3
     +++NONE+++
                  381.9 DAYS
                                36.0
 4
     +++NONE+++
                  373.4 DAYS
                                54.0
     +++NONE+++
                  369.6 DAYS
                                72.0
     +++NONE+++
                  369.1 DAYS
                                90.0
 7
     +++NONE+++
                  371.4 DAYS
                                108.0
 8
     +++NONE+++ 377.2 DAYS
                               126.0
 9
     +++NONE+++
                  388.7 DAYS
                               144.0
```

+++NONE+++ 395.0 DAYS

162.0

10

3

```
180.0
    +++NONE+++ 392.7 DAYS
11
    +++NONE+++
                  369.1 DAYS
                               198.0
12
13
    +++NONE+++
                  365.5 DAYS
                               216.0
    +++NONE+++ 387.8 DAYS
                               234.0
14
    +++NONE+++
                  383.3 DAYS
                               252.0
15
                               270.0
    +++NONE+++ 382.0 DAYS
16
    +++NONE+++ 383.1 DAYS
                               288.0
17
18
    +++NONE+++
                  387.1 DAYS
                               306.0
                               324.0
19
    +++NONE+++ 395.4 DAYS
20
    +++NONE+++ 379.5 DAYS
                               342.0
```

NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

```
1
    +++NONE+++ 374.4 DAYS
                                0.0
2
    +++NONE+++ 394.3 DAYS
                               18.0
3
    +++NONE+++ 377.8 DAYS
                               36.0
                               54.0
    +++NONE+++ 369.5 DAYS
5
    +++NONE+++ 365.9 DAYS
                               72.0
6
    +++NONE+++ 365.5 DAYS
                               90.0
7
    +++NONE+++ 367.8 DAYS
                               108.0
8
    +++NONE+++ 373.7 DAYS
                               126.0
9
    +++NONE+++ 385.4 DAYS
                               144.0
10
    +++NONE+++ 392.0 DAYS
                               162.0
    +++NONE+++ 376.4 DAYS
                               180.0
11
12
    +++NONE+++ 372.2 DAYS
                               198.0
13
    +++NONE+++ 367.9 DAYS
                               216.0
14
    +++NONE+++ 389.8 DAYS
                               234.0
15
    +++NONE+++ 385.0 DAYS
                               252.0
16
    +++NONE+++ 383.5 DAYS
                               270.0
17
    +++NONE+++ 384.5 DAYS
                               288.0
18
    +++NONE+++ 388.3 DAYS
                               306.0
19
    +++NONE+++
                 396.3 DAYS
                               324.0
20
    +++NONE+++ 379.9 DAYS
                               342.0
```

### STREAMLINES DEPARTING FROM INJECTION WELL

NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

1 +++NONE+++ 386.6 DAYS 0.0 2 +++NONE+++ 389.7 DAYS 18.0 3 +++NONE+++ 373.9 DAYS 36.0

4	+++NONE+++	366.0 DAYS	54.0
5	+++NONE+++	395.1 DAYS	72.0
6	+++NONE+++	394.8 DAYS	90.0
7	+++NONE+++	397.3 DAYS	108.0
8	+++NONE+++	370.6 DAYS	126.0
9	+++NONE+++	382.4 DAYS	144.0
10	+++NONE+++	389.4 DAYS	162.0
11	+++NONE+++	386.0 DAYS	180.0
12	+++NONE+++	374.9 DAYS	198.0
13	+++NONE+++	369.7 DAYS	216.0
14	+++NONE+++	391.2 DAYS	234.0
15	+++NONE+++	386.2 DAYS	252.0
16	+++NONE+++	384.5 DAYS	270.0
17	+++NONE+++	385.3 DAYS	288.0
18	+++NONE+++	388.9 DAYS	306.0
19	+++NONE+++	396.6 DAYS	324.0
20	+++NONE+++	379.8 DAYS	342.0

NUMBER OF	WELL	TIME OF	ANGLE BETA
STREAMLINE	REACHED	ARRIVAL	IN DEGREES

```
+++NONE+++ 394.3 DAYS
                                0.0
1
2
    +++NONE+++ 385.4 DAYS
                               18.0
3
    +++NONE+++ 370.2 DAYS
                               36.0
    +++NONE+++ 394.9 DAYS
4
                               54.0
5
    +++NONE+++ 391.7 DAYS
                               72.0
6
    +++NONE+++ 391.5 DAYS
                               90.0
7
    +++NONE+++ 394.0 DAYS
                               108.0
8
    +++NONE+++ 367.6 DAYS
                               126.0
9
    +++NONE+++ 379.6 DAYS
                               144.0
10
    +++NONE+++ 387.1 DAYS
                               162.0
    +++NONE+++ 365.5 DAYS
11
                               180.0
    +++NONE+++ 377.0 DAYS
12
                               198.0
13
    +++NONE+++ 371.0 DAYS
                               216.0
14
    +++NONE+++ 392.1 DAYS
                               234.0
15
    +++NONE+++ 386.9 DAYS
                               252.0
16
    +++NONE+++ 384.9 DAYS
                               270.0
17
    +++NONE+++ 385.6 DAYS
                               288.0
18
    +++NONE+++ 389.0 DAYS
                               306.0
19
    +++NONE+++ 396.5 DAYS
                               324.0
20
    +++NONE+++ 379.3 DAYS
                               342.0
```

STREAMLINES DEPARTING FROM INJECTION WELL

#### NUMBER OF WELL TIME OF **ANGLE BETA** STREAMLINE REACHED ARRIVAL IN DEGREES +++NONE+++ 379.6 DAYS 0.0 1 2 +++NONE+++ 381.2 DAYS 18.0 +++NONE+++ 366.6 DAYS 36.0 3 4 +++NONE+++ 391.3 DAYS 54.0 +++NONE+++ 388.3 DAYS 72.0 5 90.0 +++NONE+++ 388.2 DAYS +++NONE+++ 390.8 DAYS 108.0 7 8 +++NONE+++ 396.9 DAYS 126.0 +++NONE+++ 377.0 DAYS 144.0 9 +++NONE+++ 385.0 DAYS 162.0 10 +++NONE+++ 380.6 DAYS 180.0 11 +++NONE+++ 378.7 DAYS 198.0 12 +++NONE+++ 371.8 DAYS 216.0 13 +++NONE+++ 392.5 DAYS 234.0 14 252.0 +++NONE+++ 387.0 DAYS 15 16 +++NONE+++ 384.9 DAYS 270.0 +++NONE+++ 385.4 DAYS 288.0 17 +++NONE+++ 388.6 DAYS 306.0 18

### STREAMLINES DEPARTING FROM INJECTION WELL

+++NONE+++ 378.3 DAYS

+++NONE+++

19 20

# NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

395.8 DAYS

324.0

342.0

1	+++NONE+++	371.7 DAYS	0.0
2	+++NONE+++	377.2 DAYS	18.0
3	+++NONE+++	394.7 DAYS	36.0
4	+++NONE+++	387.9 DAYS	54.0
5	+++NONE+++	385.1 DAYS	72.0
6	+++NONE+++	385.1 DAYS	90.0
7	+++NONE+++	387.8 DAYS	108.0
8	+++NONE+++	393.9 DAYS	126.0
9	+++NONE+++	374.5 DAYS	144.0
10	+++NONE+++	383.1 DAYS	162.0
11	+++NONE+++	371.2 DAYS	180.0
12	+++NONE+++	380.1 DAYS	198.0
13	+++NONE+++	372.3 DAYS	216.0
14	+++NONE+++	392.5 DAYS	234.0
15	+++NONE+++	386.8 DAYS	252.0
16	+++NONE+++	384.5 DAYS	270.0

```
17 +++NONE+++ 384.8 DAYS 288.0

18 +++NONE+++ 387.9 DAYS 306.0

19 +++NONE+++ 394.8 DAYS 324.0

20 +++NONE+++ 376.9 DAYS 342.0
```

\*

### STREAMLINES DEPARTING FROM INJECTION WELL

NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

```
1
    +++NONE+++ 381.2 DAYS
                                0.0
    +++NONE+++ 373.2 DAYS
2
                               18.0
    +++NONE+++ 391.0 DAYS
                               36.0
3
4
    +++NONE+++ 384.5 DAYS
                               54.0
                               72.0
5
    +++NONE+++ 381.8 DAYS
                               90.0
6
    +++NONE+++ 381.9 DAYS
    +++NONE+++ 384.7 DAYS
7
                               108.0
8
    +++NONE+++ 391.0 DAYS
                               126.0
9
    +++NONE+++ 372.0 DAYS
                               144.0
10
    +++NONE+++ 381.3 DAYS
                               162.0
    +++NONE+++ 371.5 DAYS
                               180.0
11
12
    +++NONE+++ 381.0 DAYS
                               198.0
    +++NONE+++ 372.3 DAYS
                               216.0
13
    +++NONE+++ 392.0 DAYS
                               234.0
14
15
    +++NONE+++ 386.1 DAYS
                               252.0
    +++NONE+++ 383.7 DAYS
                               270.0
16
17
    +++NONE+++ 383.8 DAYS
                               288.0
18
    +++NONE+++ 386.7 DAYS
                               306.0
19
    +++NONE+++ 393.3 DAYS
                               324.0
20
    +++NONE+++ 375.1 DAYS
                               342.0
```

#### STREAMLINES DEPARTING FROM INJECTION WELL

1	+++NONE+++	369.6 DAYS	0.0
2	+++NONE+++	369.1 DAYS	18.0
3	+++NONE+++	387.2 DAYS	36.0
4	+++NONE+++	381.0 DAYS	54.0
5	+++NONE+++	378.5 DAYS	72.0
6	+++NONE+++	378.8 DAYS	90.0
7	+++NONE+++	381.6 DAYS	108.0
8	+++NONE+++	388.0 DAYS	126.0
9	+++NONE+++	369.5 DAYS	144.0

```
+++NONE+++ 379.5 DAYS
10
                                162.0
                                180.0
    +++NONE+++
                  385.4 DAYS
11
    +++NONE+++
                  381.7 DAYS
                                198.0
12
    +++NONE+++ 372.0 DAYS
                                216.0
13
    +++NONE+++
                  391.2 DAYS
                                234.0
14
15
    +++NONE+++
                  385.1 DAYS
                                252.0
    +++NONE+++ 382.4 DAYS
                                270.0
16
                  382.4 DAYS
                                288.0
    +++NONE+++
17
                  385.1 DAYS
                                306.0
18
    +++NONE+++
19
    +++NONE+++ 391.4 DAYS
                                324.0
    +++NONE+++ 372.9 DAYS
                                342.0
20
```

# NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

```
+++NONE+++ 380.7 DAYS
                                0.0
1
    +++NONE+++ 365.1 DAYS
                                18.0
2
    +++NONE+++ 383.4 DAYS
3
                                36.0
    +++NONE+++ 377.5 DAYS
                                54.0
4
5
    +++NONE+++ 375.2 DAYS
                                72.0
    +++NONE+++ 375.5 DAYS
                                90.0
6
    +++NONE+++ 378.5 DAYS
7
                               108.0
8
    +++NONE+++ 385.0 DAYS
                               126.0
9
    +++NONE+++ 366.9 DAYS
                               144.0
10
    +++NONE+++ 377.8 DAYS
                                162.0
    +++NONE+++ 390.7 DAYS
                                180.0
11
    +++NONE+++ 382.1 DAYS
12
                               198.0
    +++NONE+++ 371.2 DAYS
13
                               216.0
14
    +++NONE+++ 389.9 DAYS
                               234.0
15
    +++NONE+++ 383.6 DAYS
                               252.0
                  380.8 DAYS
16
    +++NONE+++
                               270.0
17
    +++NONE+++ 380.6 DAYS
                               288.0
18
    +++NONE+++
                  383.1 DAYS
                               306.0
19
    +++NONE+++
                  389.2 DAYS
                               324.0
20
    +++NONE+++ 370.4 DAYS
                               342.0
```

### STREAMLINES DEPARTING FROM INJECTION WELL

# NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

1 +++NONE+++ 387.3 DAYS 0.0 2 +++NONE+++ 391.3 DAYS 18.0

3	+++NONE+++	379.5 DAYS	36.0
4	+++NONE+++	373.9 DAYS	54.0
5	+++NONE+++	371.7 DAYS	72.0
6	+++NONE+++	372.2 DAYS	90.0
7	+++NONE+++	375.3 DAYS	108.0
8	+++NONE+++	381.8 DAYS	126.0
9	+++NONE+++	395.0 DAYS	144.0
10	+++NONE+++	376.1 DAYS	162.0
11	+++NONE+++	376.3 DAYS	180.0
12	+++NONE+++	382.1 DAYS	198.0
13	+++NONE+++	370.1 DAYS	216.0
14	+++NONE+++	388.3 DAYS	234.0
15	+++NONE+++	381.8 DAYS	252.0
16	+++NONE+++	378.9 DAYS	270.0
17	+++NONE+++	378.5 DAYS	288.0
18	+++NONE+++	380.7 DAYS	306.0
19	+++NONE+++	386.5 DAYS	324.0
20	+++NONE+++	367.5 DAYS	342.0

1	+++NONE+++	376.3 DAYS	0.0
2	+++NONE+++	386.7 DAYS	18.0
3	+++NONE+++	375.4 DAYS	36.0
4	+++NONE+++	370.1 DAYS	54.0
5	+++NONE+++	368.2 DAYS	72.0
6	+++NONE+++	368.8 DAYS	90.0
7	+++NONE+++	371.9 DAYS	108.0
8	+++NONE+++	378.6 DAYS	126.0
9	+++NONE+++	391.9 DAYS	144.0
10	+++NONE+++	374.3 DAYS	162.0
11	+++NONE+++	365.4 DAYS	180.0
12	+++NONE+++	381.9 DAYS	198.0
13	+++NONE+++	368.7 DAYS	216.0
14	+++NONE+++	386.3 DAYS	234.0
15	+++NONE+++	379.6 DAYS	252.0
16	+++NONE+++	376.5 DAYS	270.0
17	+++NONE+++	376.0 DAYS	288.0
18	+++NONE+++	378.0 DAYS	306.0
19	+++NONE+++	383.5 DAYS	324.0
20	+++NONE+++	395.1 DAYS	342.0

NUMBER OF	WELL	TIME OF	ANGLE BETA
STREAMLINE	REACHED	ARRIVAL	IN DEGREES

```
1 +++NONE+++ 366.8 DAYS
                              0.0
2
   +++NONE+++ 382.0 DAYS
                              18.0
3 +++NONE+++ 371.2 DAYS
                              36.0
  +++NONE+++ 366.2 DAYS
                              54.0
4
   +++NONE+++ 394.6 DAYS
                              72.0
                              90.0
6
  +++NONE+++ 365.2 DAYS
   +++NONE+++ 368.4 DAYS
7
                             108.0
8
   +++NONE+++ 375.1 DAYS
                             126.0
   +++NONE+++ 388.7 DAYS
                             144.0
9
10
   +++NONE+++ 388.7 DAYS
                              162.0
                             180.0
11
    +++NONE+++ 391.6 DAYS
12
   +++NONE+++ 381.4 DAYS
                              198.0
    +++NONE+++ 366.8 DAYS
                              216.0
13
14
    +++NONE+++ 383.9 DAYS
                              234.0
15
   +++NONE+++ 377.0 DAYS
                              252.0
    +++NONE+++ 373.8 DAYS
                              270.0
16
17
   +++NONE+++ 373.1 DAYS
                              288.0
                              306.0
18
   +++NONE+++ 374.9 DAYS
    +++NONE+++ 380.0 DAYS
19
                              324.0
20
    +++NONE+++ 391.3 DAYS
                             342.0
```

#### STREAMLINES DEPARTING FROM INJECTION WELL

1	+++NONE+++	384.1 DAYS	0.0
2	+++NONE+++	377.1 DAYS	18.0
3	+++NONE+++	366.7 DAYS	36.0
4	+++NONE+++	391.8 DAYS	54.0
5	+++NONE+++	390.4 DAYS	72.0
6	+++NONE+++	391.3 DAYS	90.0
7	+++NONE+++	394.7 DAYS	108.0
8	+++NONE+++	371.5 DAYS	126.0
9	+++NONE+++	385.3 DAYS	144.0
10	+++NONE+++	386.6 DAYS	162.0
11	+++NONE+++	385.0 DAYS	180.0
12	+++NONE+++	380.7 DAYS	198.0
13	+++NONE+++	395.3 DAYS	216.0
14	+++NONE+++	381.0 DAYS	234.0

```
15
    +++NONE+++ 374.0 DAYS
                                252.0
                  370.6 DAYS
                                270.0
16
    +++NONE+++
17
    +++NONE+++ 369.8 DAYS
                                288.0
                  371.4 DAYS
                                306.0
18
    +++NONE+++
    +++NONE+++
                  376.2 DAYS
                                324.0
19
20
    +++NONE+++ 386.9 DAYS
                                342.0
```

# NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

```
+++NONE+++ 380.5 DAYS
1
                                0.0
2
    +++NONE+++
                 371.9 DAYS
                                18.0
3
    +++NONE+++ 391.4 DAYS
                                36.0
4
    +++NONE+++ 387.1 DAYS
                                54.0
    +++NONE+++ 385.9 DAYS
5
                               72.0
6
    +++NONE+++ 387.0 DAYS
                               90.0
7
    +++NONE+++ 390.4 DAYS
                               108.0
8
    +++NONE+++ 367.7 DAYS
                               126.0
9
    +++NONE+++ 381.6 DAYS
                               144.0
    +++NONE+++ 384.3 DAYS
10
                               162.0
                  387.6 DAYS
11
    +++NONE+++
                               180.0
12
    +++NONE+++ 366.0 DAYS
                               198.0
    +++NONE+++ 392.4 DAYS
13
                               216.0
14
    +++NONE+++ 377.8 DAYS
                               234.0
15
    +++NONE+++ 370.6 DAYS
                               252.0
    +++NONE+++ 367.1 DAYS
16
                               270.0
17
    +++NONE+++
                  366.1 DAYS
                               288.0
18
    +++NONE+++ 367.4 DAYS
                               306.0
19
    +++NONE+++
                  371.9 DAYS
                               324.0
20
    +++NONE+++ 382.2 DAYS
                               342.0
```

### STREAMLINES DEPARTING FROM INJECTION WELL

1	+++NONE+++	372.3 DAYS	0.0
2	+++NONE+++	366.4 DAYS	18.0
3	+++NONE+++	386.0 DAYS	36.0
4	+++NONE+++	382.1 DAYS	54.0
5	+++NONE+++	381.1 DAYS	72.0
6	+++NONE+++	382.3 DAYS	90.0
7	+++NONE+++	385.9 DAYS	108.0

8	+++NONE+++	392.9 DAYS	126.0
9	+++NONE+++	377.6 DAYS	144.0
10	+++NONE+++	381.8 DAYS	162.0
11	+++NONE+++	390.4 DAYS	180.0
12	+++NONE+++	394.6 DAYS	198.0
13	+++NONE+++	388.9 DAYS	216.0
14	+++NONE+++	374.1 DAYS	234.0
15	+++NONE+++	366.8 DAYS	252.0
16	+++NONE+++	393.4 DAYS	270.0
17	+++NONE+++	392.1 DAYS	288.0
18	+++NONE+++	393.1 DAYS	306.0
19	+++NONE+++	367.2 DAYS	324.0
20	+++NONE+++	377.0 DAYS	342.0

### NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

1	+++NONE+++	391.9 DAYS	0.0
2	+++NONE+++	389.0 DAYS	18.0
3	+++NONE+++	380.3 DAYS	36.0
4	+++NONE+++	376.7 DAYS	54.0
5	+++NONE+++	375.9 DAYS	72.0
6	+++NONE+++	377.3 DAYS	90.0
7	+++NONE+++	381.0 DAYS	108.0
8	+++NONE+++	388.1 DAYS	126.0
9	+++NONE+++	373.4 DAYS	144.0
10	+++NONE+++	379.1 DAYS	162.0
11	+++NONE+++	369.9 DAYS	180.0
12	+++NONE+++	392.6 DAYS	198.0
13	+++NONE+++	385.0 DAYS	216.0
14	+++NONE+++	369.9 DAYS	234.0
15	+++NONE+++	392.4 DAYS	252.0
16	+++NONE+++	388.5 DAYS	270.0
17	+++NONE+++	387.1 DAYS	288.0
18	+++NONE+++	387.8 DAYS	306.0
19	+++NONE+++	391.5 DAYS	324.0
20	+++NONE+++	371.2 DAYS	342.0

# STREAMLINES DEPARTING FROM INJECTION WELL

1	+++NONE+++	383.0 DAYS	0.0
2	+++NONE+++	382.3 DAYS	18.0
3	+++NONE+++	374.2 DAYS	36.0
4	+++NONE+++	370.9 DAYS	54.0
5	+++NONE+++	370.4 DAYS	72.0
6	+++NONE+++	371.9 DAYS	90.0
7	+++NONE+++	375.7 DAYS	108.0
8	+++NONE+++	382.9 DAYS	126.0
9	+++NONE+++	368.7 DAYS	144.0
10	+++NONE+++	375.9 DAYS	162.0
11	+++NONE+++	379.2 DAYS	180.0
12	+++NONE+++	390.2 DAYS	198.0
13	+++NONE+++	380.5 DAYS	216.0
14	+++NONE+++	365.2 DAYS	234.0
15	+++NONE+++	387.1 DAYS	252.0
16	+++NONE+++	383.2 DAYS	270.0
17	+++NONE+++	381.5 DAYS	288.0
18	+++NONE+++	382.0 DAYS	306.0
19	+++NONE+++	385.3 DAYS	324.0
20	+++NONE+++	393.8 DAYS	342.0

1	+++NONE+++	373.7 DAYS	0.0
2	+++NONE+++	375.0 DAYS	18.0
3	+++NONE+++	367.6 DAYS	36.0
4	+++NONE+++	392.7 DAYS	54.0
5	+++NONE+++	392.5 DAYS	72.0
6	+++NONE+++	366.1 DAYS	90.0
7	+++NONE+++	370.0 DAYS	108.0
8	+++NONE+++	377.2 DAYS	126.0
9	+++NONE+++	391.6 DAYS	144.0
10	+++NONE+++	372.2 DAYS	162.0
11	+++NONE+++	374.7 DAYS	180.0
12	+++NONE+++	387.1 DAYS	198.0
13	+++NONE+++	375.4 DAYS	216.0
14	+++NONE+++	388.9 DAYS	234.0
15	+++NONE+++	381.3 DAYS	252.0
16	+++NONE+++	377.2 DAYS	270.0
17	+++NONE+++	375.3 DAYS	288.0
18	+++NONE+++	375.5 DAYS	306.0
19	+++NONE+++	378.4 DAYS	324.0

```
20 +++NONE+++ 386.3 DAYS 342.0
```

# NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

```
+++NONE+++ 390.6 DAYS
                               0.0
1
2
   +++NONE+++ 367.2 DAYS
                               18.0
                               36.0
3
   +++NONE+++ 387.7 DAYS
   +++NONE+++ 385.4 DAYS
                               54.0
   +++NONE+++ 385.5 DAYS
                               72.0
5
   +++NONE+++ 387.5 DAYS
                              90.0
6
7
   +++NONE+++ 391.6 DAYS
                              108.0
                              126.0
8
    +++NONE+++ 371.0 DAYS
    +++NONE+++ 385.4 DAYS
                              144.0
9
   +++NONE+++ 367.8 DAYS
                              162.0
10
                               180.0
11
    +++NONE+++ 385.4 DAYS
    +++NONE+++ 383.1 DAYS
                              198.0
12
    +++NONE+++ 369.5 DAYS
                              216.0
13
    +++NONE+++ 382.5 DAYS
                              234.0
14
    +++NONE+++ 374.7 DAYS
                              252.0
15
    +++NONE+++ 370.5 DAYS
                              270.0
16
    +++NONE+++ 368.4 DAYS
                              288.0
17
18
    +++NONE+++ 368.3 DAYS
                              306.0
19
    +++NONE+++ 370.7 DAYS
                              324.0
    +++NONE+++ 378.0 DAYS
20
                              342.0
```

#### STREAMLINES DEPARTING FROM INJECTION WELL

1	+++NONE+++	383.9 DAYS	0.0
2	+++NONE+++	385.1 DAYS	18.0
3	+++NONE+++	379.2 DAYS	36.0
4	+++NONE+++	377.3 DAYS	54.0
5	+++NONE+++	377.8 DAYS	72.0
6	+++NONE+++	380.0 DAYS	90.0
7	+++NONE+++	384.2 DAYS	108.0
8	+++NONE+++	391.5 DAYS	126.0
9	+++NONE+++	378.4 DAYS	144.0
10	+++NONE+++	389.3 DAYS	162.0
11	+++NONE+++	372.1 DAYS	180.0
12	+++NONE+++	378.0 DAYS	198.0

13	+++NONE+++	390.6 DAYS	216.0
14	+++NONE+++	375.2 DAYS	234.0
15	+++NONE+++	367.4 DAYS	252.0
16	+++NONE+++	391.0 DAYS	270.0
17	+++NONE+++	388.6 DAYS	288.0
18	+++NONE+++	388.0 DAYS	306.0
19	+++NONE+++	389.7 DAYS	324.0
20	+++NONE+++	368.7 DAYS	342.0

NUMBER OF	WELL	TIME OF	ANGLE BETA
STREAMLINE	REACHED	ARRIVAL	IN DEGREES

1	+++NONE+++	371.5 DAYS	0.0
2	+++NONE+++	374.9 DAYS	18.0
3	+++NONE+++	369.8 DAYS	36.0
4	+++NONE+++	368.5 DAYS	54.0
5	+++NONE+++	369.3 DAYS	72.0
6	+++NONE+++	371.8 DAYS	90.0
7	+++NONE+++	376.0 DAYS	108.0
8	+++NONE+++	383.3 DAYS	126.0
9	+++NONE+++	370.6 DAYS	144.0
10	+++NONE+++	382.1 DAYS	162.0
11	+++NONE+++	564.5 DAYS	180.0
12	+++NONE+++	371.3 DAYS	198.0
13	+++NONE+++	382.2 DAYS	216.0
14	+++NONE+++	366.9 DAYS	234.0
15	+++NONE+++	386.6 DAYS	252.0
16	+++NONE+++	382.0 DAYS	270.0
17	+++NONE+++	379.3 DAYS	288.0
18	+++NONE+++	378.3 DAYS	306.0
19	+++NONE+++	379.5 DAYS	324.0
20	+++NONE+++	384.9 DAYS	342.0

### STREAMLINES DEPARTING FROM INJECTION WELL

1	+++NONE+++	382.7 DAYS	0.0
2	+++NONE+++	389.2 DAYS	18.0
3	+++NONE+++	385.3 DAYS	36.0
4	+++NONE+++	384.8 DAYS	54.0
5	+++NONE+++	386 2 DAYS	72 N

6	+++NONE+++	389.1 DAYS	90.0
7	+++NONE+++	367.0 DAYS	108.0
8	+++NONE+++	374.2 DAYS	126.0
9	+++NONE+++	388.0 DAYS	144.0
10	+++NONE+++	373.2 DAYS	162.0
11	+++NONE+++	1303.5 DAYS	180.0
12	+++NONE+++	388.6 DAYS	198.0
13	+++NONE+++	372.5 DAYS	216.0
14	+++NONE+++	384.4 DAYS	234.0
15	+++NONE+++	376.6 DAYS	252.0
16	+++NONE+++	371.9 DAYS	270.0
17	+++NONE+++	368.9 DAYS	288.0
18	+++NONE+++	367.4 DAYS	306.0
19	+++NONE+++	367.9 DAYS	324.0
20	+++NONE+++	372.4 DAYS	342.0

NUMBER OF	WELL	TIME OF	ANGLE BETA
STREAMLINE	<b>REACHED</b>	ARRIVAL	IN DEGREES

1	+++NONE+++	386.1 DAYS	0.0
2	+++NONE+++	376.2 DAYS	18.0
3	+++NONE+++	373.4 DAYS	36.0
4	+++NONE+++	373.6 DAYS	54.0
5	+++NONE+++	375.5 DAYS	72.0
6	+++NONE+++	378.6 DAYS	90.0
7	+++NONE+++	383.2 DAYS	108.0
8	+++NONE+++	390.2 DAYS	126.0
9	+++NONE+++	377.3 DAYS	144.0
10	+++NONE+++	387.0 DAYS	162.0
11	+++NONE+++	380.3 DAYS	180.0
12	+++NONE+++	375.9 DAYS	198.0
13	+++NONE+++	387.4 DAYS	216.0
14	+++NONE+++	373.0 DAYS	234.0
15	+++NONE+++	365.4 DAYS	252.0
16	+++NONE+++	387.1 DAYS	270.0
17	+++NONE+++	383.7 DAYS	288.0
18	+++NONE+++	381.5 DAYS	306.0
19	+++NONE+++	381.0 DAYS	324.0
20	+++NONE+++	383.9 DAYS	342.0

# STREAMLINES DEPARTING FROM INJECTION WELL

NUMBER OF WELL TIME OF ANGLE BETA

```
STREAMLINE REACHED
                          ARRIVAL
                                      IN DEGREES
     +++NONE+++
                   375.1 DAYS
                                  0.0
 1
  2
     +++NONE+++
                   389.0 DAYS
                                  18.0
                                  36.0
 3
     +++NONE+++
                   387.8 DAYS
  4
     +++NONE+++
                   389.1 DAYS
                                  54.0
                                  72.0
 5
     +++NONE+++
                   391.5 DAYS
                   368.2 DAYS
                                  90.0
 6
     +++NONE+++
                   372.5 DAYS
 7
     +++NONE+++
                                 108.0
 8
     +++NONE+++
                   379.1 DAYS
                                 126.0
 9
     +++NONE+++
                   365.4 DAYS
                                 144.0
 10
      +++NONE+++
                  372.0 DAYS
                                  162.0
                    383.0 DAYS
                                  180.0
      +++NONE+++
 11
 12
      +++NONE+++
                   384.4 DAYS
                                  198.0
 13
      +++NONE+++
                    373.9 DAYS
                                  216.0
                                  234.0
 14
      +++NONE+++
                    386.9 DAYS
 15
      +++NONE+++
                   379.8 DAYS
                                  252.0
      +++NONE+++
                    375.0 DAYS
                                  270.0
 16
 17
      +++NONE+++
                    371.3 DAYS
                                  288.0
                    368.6 DAYS
                                  306.0
 18
      +++NONE+++
 19
      +++NONE+++
                    367.3 DAYS
                                  324.0
 20
      +++NONE+++
                    368.7 DAYS
                                  342.0
STREAMLINES DEPARTING FROM INJECTION WELL
             WELL
NUMBER OF
                       TIME OF
                                  ANGLE BETA
STREAMLINE REACHED
                          ARRIVAL
                                      IN DEGREES
 1
     +++NONE+++
                   383.2 DAYS
                                  0.0
 2
     +++NONE+++
                   381.4 DAYS
                                  18.0
 3
     +++NONE+++
                   381.2 DAYS
                                 36.0
 4
     +++NONE+++
                   382.8 DAYS
                                 54.0
 5
     +++NONE+++
                   385.1 DAYS
                                 72.0
 6
     +++NONE+++
                   387.9 DAYS
                                 90.0
 7
     +++NONE+++
                   391.5 DAYS
                                 108.0
 8
     +++NONE+++
                   369.6 DAYS
                                 126.0
 9
     +++NONE+++
                   380.0 DAYS
                                 144.0
 10
      +++NONE+++ 379.9 DAYS
                                 162.0
 11
      +++NONE+++
                   385.8 DAYS
                                 180.0
 12
      +++NONE+++
                   389.4 DAYS
                                 198.0
 13
      +++NONE+++
                   386.8 DAYS
                                 216.0
 14
      +++NONE+++
                   375.5 DAYS
                                 234.0
 15
     +++NONE+++
                   369.5 DAYS
                                 252.0
 16
      +++NONE+++
                   365.3 DAYS
                                 270.0
 17
     +++NONE+++
                   390.0 DAYS
                                 288.0
```

33

```
+++NONE+++ 387.3 DAYS
                                306.0
 18
                                324.0
      +++NONE+++
                   385.4 DAYS
 19
      +++NONE+++
                   385.4 DAYS
                                342.0
 20
STREAMLINES DEPARTING FROM INJECTION WELL
                                 ANGLE BETA
                      TIME OF
NUMBER OF
             WELL
STREAMLINE REACHED
                         ARRIVAL
                                     IN DEGREES
                                 0.0
     +++NONE+++ 382.9 DAYS
  1
  2
     +++NONE+++
                   388.4 DAYS
                                18.0
                   388.4 DAYS
                                36.0
  3
     +++NONE+++
     +++NONE+++ 389.2 DAYS
                                54.0
  5
     +++NONE+++ 390.3 DAYS
                                72.0
     +++NONE+++ 391.5 DAYS
                                90.0
  6
  7
     +++NONE+++ 393.4 DAYS
                                108.0
  8
     +++NONE+++ 367.7 DAYS
                                126.0
  9
     +++NONE+++ 375.2 DAYS
                                144.0
                                162.0
 10
     +++NONE+++ 365.5 DAYS
 11
      +++NONE+++
                   379.7 DAYS
                                180.0
 12
      +++NONE+++
                   371.5 DAYS
                                198.0
                                216.0
 13
      +++NONE+++ 379.9 DAYS
 14
      +++NONE+++
                   371.8 DAYS
                                234.0
                   367.8 DAYS
                                252.0
 15
      +++NONE+++
 16
      +++NONE+++ 365.4 DAYS
                                270.0
      +++NONE+++
                   393.5 DAYS
                                288.0
 17
      +++NONE+++
                   392.1 DAYS
                                306.0
 18
 19
      +++NONE+++ 391.0 DAYS
                                324.0
 20
      +++NONE+++ 390.8 DAYS
                                342.0
STREAMLINES DEPARTING FROM INJECTION WELL
NUMBER OF WELL
                      TIME OF
                                 ANGLE BETA
STREAMLINE REACHED
                         ARRIVAL
                                    IN DEGREES
     +++NONE+++ 389.7 DAYS
 1
                                0.0
 2
     +++NONE+++ 389.2 DAYS
                                18.0
 3
     +++NONE+++ 388.2 DAYS
                                36.0
 4
     +++NONE+++ 386.9 DAYS
                                54.0
 5
     +++NONE+++ 385.4 DAYS
                                72.0
 6
     +++NONE+++ 383.9 DAYS
                                90.0
 7
     +++NONE+++ 383.0 DAYS
                                108.0
 8
     +++NONE+++
                 383.4 DAYS
                               126.0
 9
     +++NONE+++ 386.6 DAYS
                               144.0
```

1

1

10

+++NONE+++ 394.7 DAYS

162.0

```
180.0
    +++NONE+++
                  378.2 DAYS
11
                  367.4 DAYS
                                198.0
12
     +++NONE+++
     +++NONE+++
                  389.4 DAYS
                                216.0
13
                                234.0
14
     +++NONE+++
                  385.9 DAYS
                  385.2 DAYS
                                252.0
15
     +++NONE+++
                                270.0
     +++NONE+++
                  385.9 DAYS
16
17
     +++NONE+++
                  387.0 DAYS
                                288.0
     +++NONE+++
                  388.2 DAYS
                                306.0
18
                  389.1 DAYS
                                324.0
19
     +++NONE+++
                                342.0
20
     +++NONE+++ 389.6 DAYS
```

NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

```
1
    +++NONE+++
                  376.8 DAYS
                                 0.0
2
    +++NONE+++
                  391.4 DAYS
                                 18.0
3
    +++NONE+++
                  372.3 DAYS
                                36.0
                  370.8 DAYS
4
    +++NONE+++
                                54.0
5
    +++NONE+++
                  381.3 DAYS
                                72.0
                  366.0 DAYS
                                90.0
6
    +++NONE+++
7
    +++NONE+++
                  387.2 DAYS
                                108.0
8
    +++NONE+++
                  384.6 DAYS
                                126.0
9
    +++NONE+++
                  384.2 DAYS
                                144.0
10
    +++NONE+++
                  384.6 DAYS
                                162.0
11
    +++NONE+++
                  385.2 DAYS
                                180.0
12
    +++NONE+++
                  385.5 DAYS
                                198.0
13
    +++NONE+++
                  385.5 DAYS
                                216.0
14
    +++NONE+++
                  385.6 DAYS
                                234.0
15
    +++NONE+++
                  386.1 DAYS
                                252.0
                  388.2 DAYS
    +++NONE+++
                                270.0
16
17
    +++NONE+++
                  393.1 DAYS
                                288.0
18
    +++NONE+++
                  374.7 DAYS
                                306.0
    +++NONE+++
                  366.6 DAYS
19
                                324.0
    +++NONE+++
20
                  389.7 DAYS
                                342.0
```

### STREAMLINES DEPARTING FROM INJECTION WELL

- 1 +++NONE+++ 432.8 DAYS 0.0 2 +++NONE+++ 399.7 DAYS 18.0
- 3 +++NONE+++ 380.8 DAYS 36.0

4	+++NONE+++	380.8 DAYS	54.0
5	+++NONE+++	366.6 DAYS	72.0
6	+++NONE+++	366.5 DAYS	90.0
7	+++NONE+++	387.2 DAYS	108.0
8	+++NONE+++	384.0 DAYS	126.0
9	+++NONE+++	382.9 DAYS	144.0
10	+++NONE+++	382.7 DAYS	162.0
11	+++NONE+++	382.7 DAYS	180.0
12	+++NONE+++	382.7 DAYS	198.0
13	+++NONE+++	382.8 DAYS	216.0
14	+++NONE+++	383.6 DAYS	234.0
15	+++NONE+++	386.4 DAYS	252.0
16	+++NONE+++	365.4 DAYS	270.0
17	+++NONE+++	366.9 DAYS	288.0
18	+++NONE+++	370.3 DAYS	306.0
19	+++NONE+++	378.9 DAYS	324.0
20	+++NONE+++	443.5 DAYS	342.0

NUM	BER OF WEI	LL	TIME C	F AN	GLE BETA
STRE	AMLINE REA	CHED	ARI	RIVAL	IN DEGREES
	-				
1	+++NONE+++	391.	8 DAYS	0.0	
2	+++NONE+++	374.	7 DAYS	18.0	
3	+++NONE+++	374.	1 DAYS	36.0	
4	+++NONE+++	385.	0 DAYS	54.0	
5	+++NONE+++	367.	9 DAYS	72.0	
6	+++NONE+++	368.	3 DAYS	90.0	
7	+++NONE+++	389.	2 DAYS	108.0	
8	+++NONE+++	386.	1 DAYS	126.0	
9	+++NONE+++	385.	0 DAYS	144.0	
10	+++NONE+++	<b>- 384</b> .	.7 DAYS	3 162.0	)
11	+++NONE+++	- 384.	7 DAYS	S 180.0	)
12	+++NONE+++	- 384.	9 DAYS	3 198.0	)
13	+++NONE+++	- 385.	5 DAYS	216.0	)
14	+++NONE+++	- 387.	4 DAYS	3 234.0	)
15	+++NONE+++	- 392.	4 DAYS	252.0	)
16	+++NONE+++	- 376.	8 DAYS	270.0	)
17	+++NONE+++	- 390.	9 DAYS	288.0	)
18	+++NONE+++	- 367.	7 DAYS	306.0	)
19	+++NONE+++	408.	8 DAYS	324.0	
20	+++NONE+++	373.	5 DAYS	342.0	)

STREAMLINES DEPARTING FROM INJECTION WELL

#### NUMBER OF WELL TIME OF **ANGLE BETA** STREAMLINE REACHED **ARRIVAL** IN DEGREES 391.6 DAYS 0.0 1 +++NONE+++ 378.9 DAYS 2 +++NONE+++ 18.0 375.5 DAYS 36.0 3 +++NONE+++ 54.0 4 +++NONE+++ 386.9 DAYS +++NONE+++ 5 383.0 DAYS 72.0 90.0 6 +++NONE+++ 369.3 DAYS +++NONE+++ 390.9 DAYS 108.0 7 388.2 DAYS 126.0 +++NONE+++ 8 +++NONE+++ 387.4 DAYS 144.0 +++NONE+++ 387.3 DAYS 162.0 10 +++NONE+++ 387.6 DAYS 11 180.0 +++NONE+++ 388.1 DAYS 198.0 12 13 +++NONE+++ 389.3 DAYS 216.0 14 +++NONE+++ 392.1 DAYS 234.0 252.0 15 +++NONE+++ 371.1 DAYS +++NONE+++ 388.9 DAYS 270.0 16 +++NONE+++ 377.1 DAYS 288.0 17 18 +++NONE+++ 411.3 DAYS 306.0 19 +++NONE+++ 375.1 DAYS 324.0 +++NONE+++ 374.6 DAYS 342.0 20

### STREAMLINES DEPARTING FROM INJECTION WELL

1	+++NONE+++	396.7 DAYS	0.0
2	+++NONE+++	385.8 DAYS	18.0
3	+++NONE+++	380.9 DAYS	36.0
4	+++NONE+++	387.2 DAYS	54.0
5	+++NONE+++	382.9 DAYS	72.0
6	+++NONE+++	369.0 DAYS	90.0
7	+++NONE+++	391.7 DAYS	108.0
8	+++NONE+++	389.7 DAYS	126.0
9	+++NONE+++	389.3 DAYS	144.0
10	+++NONE+++	389.7 DAYS	162.0
11	+++NONE+++	390.3 DAYS	180.0
12	+++NONE+++	391.2 DAYS	198.0
13	+++NONE+++	392.8 DAYS	216.0
14	+++NONE+++	368.0 DAYS	234.0
15	+++NONE+++	377.0 DAYS	252.0
16	+++NONE+++	373.5 DAYS	270.0

```
17 +++NONE+++ 378.7 DAYS 288.0

18 +++NONE+++ 376.3 DAYS 306.0

19 +++NONE+++ 380.3 DAYS 324.0

20 +++NONE+++ 382.0 DAYS 342.0
```

# NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

```
+++NONE+++ 371.3 DAYS
                               0.0
1
2
   +++NONE+++ 388.9 DAYS
                               18.0
    +++NONE+++ 382.6 DAYS
                               36.0
   +++NONE+++ 383.1 DAYS
4
                               54.0
5
   +++NONE+++ 370.2 DAYS
                               72.0
    +++NONE+++ 367.7 DAYS
                               90.0
6
    +++NONE+++ 392.3 DAYS
                               108.0
7
    +++NONE+++ 391.2 DAYS
                               126.0
8
9
    +++NONE+++ 391.4 DAYS
                               144.0
10
    +++NONE+++ 392.1 DAYS
                               162.0
    +++NONE+++ 393.0 DAYS
                               180.0
11
    +++NONE+++ 394.1 DAYS
                               198.0
12
13
    +++NONE+++ 367.0 DAYS
                               216.0
14
    +++NONE+++ 371.3 DAYS
                               234.0
    +++NONE+++ 381.7 DAYS
                               252.0
15
    +++NONE+++ 384.3 DAYS
                               270.0
16
17
    +++NONE+++ 370.0 DAYS
                               288.0
    +++NONE+++ 391.5 DAYS
18
                               306.0
    +++NONE+++ 383.5 DAYS
19
                               324.0
20
    +++NONE+++ 386.5 DAYS
                               342.0
```

#### STREAMLINES DEPARTING FROM INJECTION WELL

1	+++NONE+++	377.7 DAYS	0.0
2	+++NONE+++	368.8 DAYS	18.0
3	+++NONE+++	390.3 DAYS	36.0
4	+++NONE+++	388.1 DAYS	54.0
5	+++NONE+++	370.1 DAYS	72.0
6	+++NONE+++	368.3 DAYS	90.0
7	+++NONE+++	365.6 DAYS	108.0
8	+++NONE+++	365.3 DAYS	126.0
9	+++NONE+++	365.8 DAYS	144 0

```
366.7 DAYS
                                162.0
10
    +++NONE+++
11
    +++NONE+++
                  367.5 DAYS
                                180.0
12
    +++NONE+++
                  368.6 DAYS
                                198.0
13
    +++NONE+++
                  370.5 DAYS
                                216.0
14
    +++NONE+++
                 374.8 DAYS
                                234.0
15
     +++NONE+++
                  385.8 DAYS
                                252.0
                  365.4 DAYS
16
     +++NONE+++
                                270.0
17
     +++NONE+++ 525.8 DAYS
                                288.0
                                306.0
18
     +++NONE+++
                  378.2 DAYS
19
     +++NONE+++
                  382.7 DAYS
                                324.0
20
     +++NONE+++ 390.0 DAYS
                                342.0
```

NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

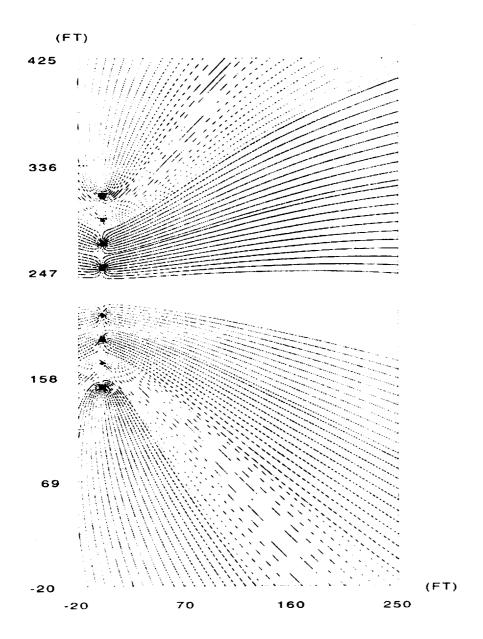
```
+++NONE+++
                  379.4 DAYS
                                 0.0
1
2
    +++NONE+++
                  374.0 DAYS
                                 18.0
3
    +++NONE+++
                  370.0 DAYS
                                 36.0
                  368.2 DAYS
4
    +++NONE+++
                                54.0
5
    +++NONE+++
                  376.7 DAYS
                                72.0
6
    +++NONE+++
                 379.0 DAYS
                                90.0
7
    +++NONE+++
                  377.8 DAYS
                                108.0
8
    +++NONE+++
                  377.9 DAYS
                                126.0
9
    +++NONE+++ 378.1 DAYS
                                144.0
    +++NONE+++ 378.3 DAYS
10
                                162.0
11
    +++NONE+++
                  378.2 DAYS
                                180.0
12
    +++NONE+++
                  378.3 DAYS
                                198.0
13
    +++NONE+++
                 379.2 DAYS
                                216.0
                  382.6 DAYS
14
    +++NONE+++
                                234.0
15
    +++NONE+++
                  392.6 DAYS
                                252.0
16
    +++NONE+++
                  366.6 DAYS
                                270.0
17
    +++NONE+++
                  372.2 DAYS
                                288.0
18
    +++NONE+++
                  370.0 DAYS
                                306.0
19
    +++NONE+++
                  370.0 DAYS
                                324.0
20
    +++NONE+++
                  386.9 DAYS
                                342.0
```

### STREAMLINES DEPARTING FROM INJECTION WELL

NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

1 +++NONE+++ 386.0 DAYS 0.0 2 +++NONE+++ 385.2 DAYS 18.0

3	+++NONE+++	384.9 DAYS	36.0
4	+++NONE+++	384.6 DAYS	54.0
5	+++NONE+++	384.2 DAYS	72.0
6	+++NONE+++	383.5 DAYS	90.0
7	+++NONE+++	382.3 DAYS	108.0
8	+++NONE+++	380.6 DAYS	126.0
9	+++NONE+++	378.5 DAYS	144.0
10	+++NONE+++	376.0 DAYS	162.0
11	+++NONE+++	373.5 DAYS	180.0
12	+++NONE+++	371.4 DAYS	198.0
13	+++NONE+++	370.2 DAYS	216.0
14	+++NONE+++	371.5 DAYS	234.0
15	+++NONE+++	378.1 DAYS	252.0
16	+++NONE+++	395.1 DAYS	270.0
17	+++NONE+++	393.5 DAYS	288.0
18	+++NONE+++	371.9 DAYS	306.0
19	+++NONE+++	392.8 DAYS	324.0
20	+++NONE+++	388.1 DAYS	342.0



#### Rockford FS - Area 11

FT AND DA SYSTEM OF UNITS IS USED

REGIONAL FLOW, PORE VELOCITY = 0.08 FT/DAY

ORIENTATION OF REGIONAL FLOW = 157.00 DEGREES

THICKNESS OF THE AQUIFER = 101.00 FEET

POROSITY = 25.00 PERCENT

PERIOD STUDIED = 3650.00 DAYS

INITIAL AQUIFER CONCENTRATION = 0.000E-01

**DEFAULT INJECTION CONCENTRATION = 0.000E-01** 

STREAMLINE STEP LENGTH = 0.40 FEET

ADSORPTION CAPACITY OF ROCK = 00.00 PERCENT

NUMBER OF INJECTION WELLS = 0

NUMBER OF PUMPING WELLS = 9

### 1 9 PRODUCTION WELLS

<b>WELL NAME</b>	X	Y	FLOW-	RATE	<b>RADIUS</b>	<b>INDICATOR</b>
FEET	FEET		FT3/DAY	<b>FEET</b>		

0.00	150.00	855.50	2.50E-01	0
0.00	170.00	855.50	2.50E-01	0
0.00	190.00	855.50	2.50E-01	0
0.00	210.00	855.50	2.50E-01	0
0.00	230.00	855.50	2.50E-01	0
0.00	250.00	855.50	2.50E-01	0
0.00	270.00	855.50	2.50E-01	0
0.00	290.00	855.50	2.50E-01	0
0.00	310.00	855.50	2.50E-01	0



### STREAMLINES DEPARTING FROM INJECTION WELL

1	+++NONE+++	3650.7 DAYS	0.0
2	+++NONE+++	3652.4 DAYS	18.0
3	+++NONE+++	3650.1 DAYS	36.0
4	+++NONE+++	3652.3 DAYS	54.0
5	+++NONE+++	3652.0 DAYS	72.0
6	+++NONE+++	3652.4 DAYS	90.0
7	+++NONE+++	3651.5 DAYS	108.0
8	+++NONE+++	3651.6 DAYS	126.0
9	+++NONE+++	3650.8 DAYS	144.0

```
+++NONE+++ 3650.5 DAYS
                                 162.0
10
    +++NONE+++ 3651.3 DAYS
                                 180.0
11
12
    +++NONE+++ 3650.4 DAYS
                                 198.0
    +++NONE+++ 3651.2 DAYS
                                 216.0
13
    +++NONE+++ 3650.6 DAYS
14
                                 234.0
    +++NONE+++ 3651.9 DAYS
                                 252.0
15
    +++NONE+++ 3652.2 DAYS
                                 270.0
16
    +++NONE+++ 3651.6 DAYS
                                 288.0
17
    +++NONE+++ 3650.2 DAYS
                                 306.0
18
19
    +++NONE+++ 3651.0 DAYS
                                 324.0
    +++NONE+++ 3651.2 DAYS
                                 342.0
20
```

# NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

```
+++NONE+++ 3652.5 DAYS
                                 0.0
1
                                 18.0
2
    +++NONE+++ 3650.6 DAYS
    +++NONE+++ 3650.1 DAYS
                                 36.0
3
    +++NONE+++ 3650.7 DAYS
                                 54.0
4
    +++NONE+++ 3651.5 DAYS
                                 72.0
5
    +++NONE+++ 3650.4 DAYS
                                 90.0
6
    +++NONE+++ 3650.7 DAYS
7
                                108.0
8
    +++NONE+++ 3652.5 DAYS
                                126.0
9
    +++NONE+++ 3650.7 DAYS
                                144.0
    +++NONE+++ 3652.8 DAYS
                                 162.0
10
    +++NONE+++ 3650.2 DAYS
                                 180.0
11
    +++NONE+++ 3652.3 DAYS
12
                                 198.0
    +++NONE+++ 3650.1 DAYS
13
                                 216.0
14
    +++NONE+++ 3652.5 DAYS
                                 234.0
15
    +++NONE+++ 3652.7 DAYS
                                 252.0
    +++NONE+++ 3652.1 DAYS
                                 270.0
16
17
    +++NONE+++ 3652.7 DAYS
                                 288.0
18
    +++NONE+++ 3650.6 DAYS
                                 306.0
    +++NONE+++ 3652.6 DAYS
19
                                 324.0
20
    +++NONE+++ 3650.3 DAYS
                                 342.0
```

#### STREAMLINES DEPARTING FROM INJECTION WELL

# NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

1 +++NONE+++ 3651.0 DAYS 0.0 2 +++NONE+++ 3651.5 DAYS 18.0

3	+++NONE+++	3650.3 DAYS	36.0
4	+++NONE+++	3650.0 DAYS	54.0
5	+++NONE+++	3652.7 DAYS	72.0
6	+++NONE+++	3650.9 DAYS	90.0
7	+++NONE+++	3650.8 DAYS	108.0
8	+++NONE+++	3651.9 DAYS	126.0
9	+++NONE+++	3653.1 DAYS	144.0
10	+++NONE+++	3652.7 DAYS	162.0
11	+++NONE+++	3651.3 DAYS	180.0
12	+++NONE+++	3652.2 DAYS	198.0
13	+++NONE+++	3652.3 DAYS	216.0
14	+++NONE+++	3651.3 DAYS	234.0
15	+++NONE+++	3651.5 DAYS	252.0
16	+++NONE+++	3650.5 DAYS	270.0
17	+++NONE+++	3652.6 DAYS	288.0
18	+++NONE+++	3651.5 DAYS	306.0
19	+++NONE+++	3651.1 DAYS	324.0
20	+++NONE+++	3651.9 DAYS	342.0

1	+++NONE+++	3650.0 DAYS	0.0
2	+++NONE+++	3652.9 DAYS	18.0
3	+++NONE+++	3651.0 DAYS	36.0
4	+++NONE+++	3652.9 DAYS	54.0
5	+++NONE+++	3651.9 DAYS	72.0
6	+++NONE+++	3652.5 DAYS	90.0
7	+++NONE+++	3650.4 DAYS	108.0
8	+++NONE+++	3651.7 DAYS	126.0
9	+++NONE+++	3653.4 DAYS	144.0
10	+++NONE+++	3650.5 DAYS	162.0
11	+++NONE+++	3650.8 DAYS	180.0
12	+++NONE+++	3651.1 DAYS	198.0
13.	+++NONE+++	3651.4 DAYS	216.0
14	+++NONE+++	3651.3 DAYS	234.0
15	+++NONE+++	3653.0 DAYS	252.0
16	+++NONE+++	3652.5 DAYS	270.0
17	+++NONE+++	3652.2 DAYS	288.0
18	+++NONE+++	3651.3 DAYS	306.0
19	+++NONE+++	3650.8 DAYS	324.0
20	+++NONE+++	3651.3 DAYS	342.0

# NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

```
+++NONE+++ 3650.3 DAYS
                                 0.0
1
    +++NONE+++ 3652.7 DAYS
2
                                 18.0
    +++NONE+++ 3650.5 DAYS
                                 36.0
3
4
    +++NONE+++ 3651.9 DAYS
                                 54.0
    +++NONE+++ 3650.6 DAYS
                                 72.0
5
    +++NONE+++ 3651.3 DAYS
                                 90.0
6
7
    +++NONE+++ 3654.9 DAYS
                                108.0
    +++NONE+++ 3653.3 DAYS
                                126.0
8
9
    +++NONE+++ 3654.8 DAYS
                                144.0
10
    +++NONE+++ 3650.1 DAYS
                                 162.0
11
    +++NONE+++ 3651.3 DAYS
                                 180.0
12
    +++NONE+++ 3650.7 DAYS
                                 198.0
    +++NONE+++ 3653.1 DAYS
                                 216.0
13
    +++NONE+++ 3650.4 DAYS
                                 234.0
14
15
    +++NONE+++ 3653.1 DAYS
                                 252.0
    +++NONE+++ 3651.2 DAYS
16
                                 270.0
    +++NONE+++ 3650.9 DAYS
17
                                 288.0
    +++NONE+++ 3652.7 DAYS
18
                                 306.0
19
    +++NONE+++ 3651.9 DAYS
                                 324.0
20
    +++NONE+++ 3652.0 DAYS
                                 342.0
```

#### STREAMLINES DEPARTING FROM INJECTION WELL

```
1
    +++NONE+++ 3651.4 DAYS
                                 0.0
2
    +++NONE+++ 3651.0 DAYS
                                 18.0
3
    +++NONE+++ 3651.8 DAYS
                                 36.0
    +++NONE+++ 3650.7 DAYS
4
                                 54.0
5
    +++NONE+++ 3650.0 DAYS
                                72.0
6
    +++NONE+++ 3651.6 DAYS
                                90.0
7
    +++NONE+++ 3654.2 DAYS
                                108.0
8
    +++NONE+++ 3652.9 DAYS
                                126.0
9
    +++NONE+++ 3650.2 DAYS
                                144.0
10
    +++NONE+++ 3654.9 DAYS
                                162.0
11
    +++NONE+++ 3656.0 DAYS
                                180.0
12
    +++NONE+++ 3655.3 DAYS
                                198.0
13
    +++NONE+++ 3654.6 DAYS
                                216.0
14
    +++NONE+++ 3652.8 DAYS
                                234.0
```

```
15 +++NONE+++ 3651.4 DAYS 252.0

16 +++NONE+++ 3652.5 DAYS 270.0

17 +++NONE+++ 3652.4 DAYS 288.0

18 +++NONE+++ 3651.2 DAYS 306.0

19 +++NONE+++ 3650.2 DAYS 324.0

20 +++NONE+++ 3650.2 DAYS 342.0
```

### NUMBER OF WELL TIME OF ANGLE BETA STREAMLINE REACHED ARRIVAL IN DEGREES

1	+++NONE+++	3652.8 DAYS	0.0
2	+++NONE+++	3650.6 DAYS	18.0
3	+++NONE+++	3650.1 DAYS	36.0
4	+++NONE+++	3650.9 DAYS	54.0
5	+++NONE+++	3652.5 DAYS	72.0
6	+++NONE+++	3651.0 DAYS	90.0
7	+++NONE+++	3653.0 DAYS	108.0
8	+++NONE+++	3651.0 DAYS	126.0
9	+++NONE+++	3652.0 DAYS	144.0
10	+++NONE+++	3651.4 DAYS	162.0
11	+++NONE+++	3651.8 DAYS	180.0
12	+++NONE+++	3655.7 DAYS	198.0
13	+++NONE+++	3651.2 DAYS	216.0
14	+++NONE+++	3657.6 DAYS	234.0
15	+++NONE+++	3654.5 DAYS	252.0
16	+++NONE+++	3650.7 DAYS	270.0
17	+++NONE+++	3651.2 DAYS	288.0
18	+++NONE+++	3650.4 DAYS	306.0
19	+++NONE+++	3652.9 DAYS	324.0
20	+++NONE+++	3650.6 DAYS	342.0

# STREAMLINES DEPARTING FROM INJECTION WELL

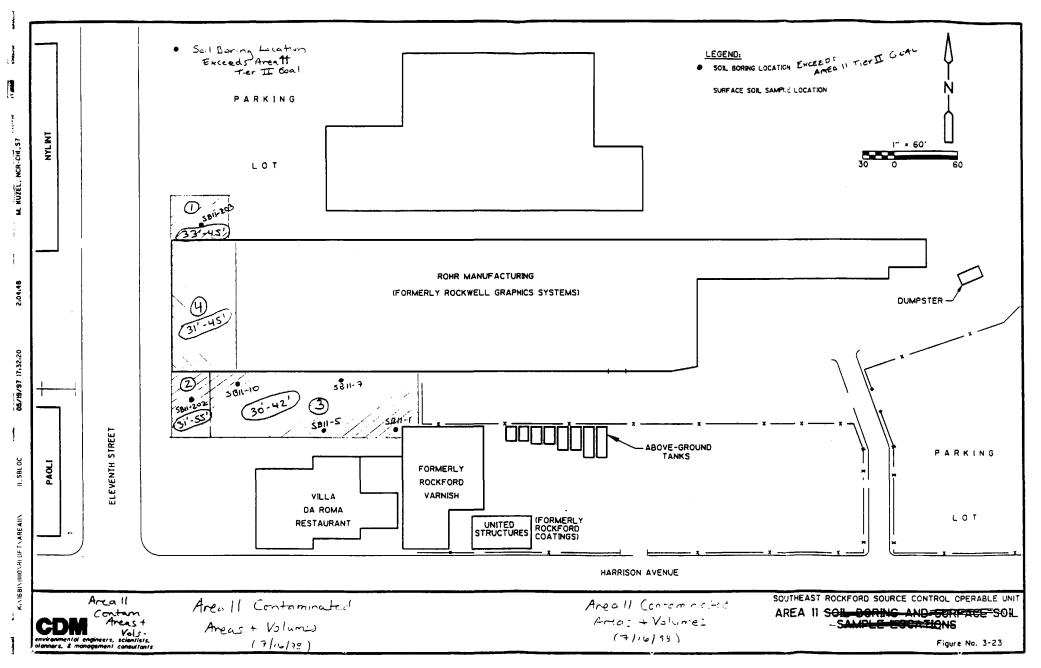
1	+++NONE+++	3651.2 DAYS	0.0
2	+++NONE+++	3652.5 DAYS	18.0
3	+++NONE+++	3650.1 DAYS	36.0
4	+++NONE+++	3652.8 DAYS	54.0
5	+++NONE+++	3651.2 DAYS	72.0
6	+++NONE+++	3650.2 DAYS	90.0
7	+++NONE+++	3651.4 DAYS	108.0

```
8
    +++NONE+++ 3651.5 DAYS
                                126.0
9
    +++NONE+++ 3651.0 DAYS
                                144.0
    +++NONE+++ 3650.7 DAYS
10
                                162.0
    +++NONE+++ 3650.8 DAYS
                                180.0
11
12
    +++NONE+++ 3650.7 DAYS
                                198.0
13
    +++NONE+++ 3653.7 DAYS
                                216.0
14
    +++NONE+++ 3650.5 DAYS
                                234.0
15
    +++NONE+++ 3650.1 DAYS
                                252.0
    +++NONE+++ 3650.8 DAYS
16
                                270.0
    +++NONE+++ 3650.0 DAYS
                                288.0
17
18
    +++NONE+++ 3650.7 DAYS
                                306.0
19
    +++NONE+++ 3652.1 DAYS
                                324.0
20
    +++NONE+++ 3652.1 DAYS
                                342.0
```

7

### STREAMLINES DEPARTING FROM INJECTION WELL

1	+++NONE+++	3651.8 DAYS	0.0
2	+++NONE+++	3651.3 DAYS	18.0
3	+++NONE+++	3651.5 DAYS	36.0
4	+++NONE+++	3652.6 DAYS	54.0
5	+++NONE+++	3651.3 DAYS	72.0
6	+++NONE+++	3650.5 DAYS	90.0
7	+++NONE+++	3650.3 DAYS	108.0
8	+++NONE+++	3650.2 DAYS	126.0
9	+++NONE+++	3650.0 DAYS	144.0
10	+++NONE+++	3652.7 DAYS	162.0
11	+++NONE+++	3651.6 DAYS	180.0
12	+++NONE+++	3652.7 DAYS	198.0
13	+++NONE+++	3652.4 DAYS	216.0
14	+++NONE+++	3650.0 DAYS	234.0
15	+++NONE+++	3650.5 DAYS	252.0
16	+++NONE+++	3652.0 DAYS	270.0
17	+++NONE+++	3651.2 DAYS	288.0
18	+++NONE+++	3652.0 DAYS	306.0
19	+++NONE+++	3651.1 DAYS	324.0
20	+++NONE+++	3652.9 DAYS	342.0



. <b>X</b> e	F.xcecd 5	Tier I	[ (5/19/9,0	1,
-71	RBSLC	lean-up	C (5/19/92 Goals	•

RBSL Clean-up Goals ORG-SB-7								
RBSL Clean-up Goo	als	ORG-SE		~ (10	opan (	P	d	
Date Sampled	6/13/96	6/13/96	6/13/96	7	6/25/96	6/25/96	7	
	SB7-101(D)	SB7-102(S)	SB7-102(D)	( 8	SB7-201-13	SB7-202-6	1	
Depth (ft. bgs)	7-9	3-5	6-8	/	25-27	11-13	1	
Organic Traffic Report Number	EBGB7	EBGB8	EBGB9	<u> </u>	EBGL9	EBGM0		
Volatile Organics (ug/Kg)	•			'	T			
Chloromethane	11 U	110006	111	U 1 <sub>1</sub> a	1300 U	1400	ו יי ט	
Bromomethane	11 U 💥	11 U 🔠		Usaca:	1300 山路線	1400		
Vinyl Chloride	11 U	11 U		UM	1300 以海拔之	1400	י עוני	
Chloroethane	11 U 4 6	11 U	11	URBE	1300 U	1400	U' *'\-	
Methylene Chloride	19 BU	14 BU	111	JBU#	1300 BJU	3200		
Acetone	11 JBU	11 JBU		JBU *	1300 U W	1400		
Carbon Disulfide	11 U	11 U.S.F.	11	USBEL	1300 U	1400	U	
1,1-Dichloroethene	11 U 🕍	11 U	11	U	1300	1400		
1,1-Dichloroethane	11 Ut 14	11 U	11	U	2900	1400	U	
1,2-Dichloroethene (total) (عنام 1,2-Dichloroethene (total)	11 U	11 0	7		<b>米~~47000 国</b>	1400	U	
Chloroform	11 U	11 U 7	11	Uac	570 沙洲教			
1,2-Dichloroethane	11 U	11 U 1		リ製製	1300	1400		
2-Butanone	11 U 🕬	11 U 🗱		い機能性	1300 U	1400	U B	
1,1,1-Trichloroethane (+31 ppb)	11 U 潜域	11 0 48		ンははない	>4-460000 D	1100		
Carbon Tetrachloride	11 U 📆	11 0 3		が設備し	1300 世書線	1400	U. Hall	
Bromodichloromethane	11 🛡 👑	11 以認識		UMP	1300 🗸	1400		
1,2-Dichloropropane	11 U 1/25	11 01 287	11	UM	1300 🗓	1400		
cis-1,3-Dichloropropene	11 U 🐠	11 0		U	1300 U	1400	U	
Trichloroethene (4776)	11 世紀	11 U			💥 96000 D		Jan 🕶	
Dibromochloromethane	11 U 435			UARY	1300	1400	U 😿	
1,1,2-Trichloroethane (حرم عرم عرم عرم عرم عرم عرب علم	11 U	11 Und		Udan	¥ 460 J		U''\$	
Benzene	11 U 🥍	11 0 % 8		U	220 1	1400	U. F.	
trans-1,3-Dichloropropene	11 U 🗱	11 0 184		ははない	1300 🗓 💢		UARE	
Bromoform	11 以海外	11 0 3		UAMB	1300 Ü			
4-Methyl-2-Pentanone	11 U 🗱	11 U W		UKR	1300 U		U.Ma	
2-Hexanone	11 U\$	11 U M	11	Uales	1300 U	1400	UT A	
Tetrachloroethene (マタタン	11 U (88)				23000			
1,1,2,2-Tetrachloroethane	11 U. 3		11	U S	1300 U		U2*X	
Toluene (848772)	11 U		11	URRET		7500		
Chlorobenzene	11 U \$			UARA	1300 U		1	
Ethylbenzene (1065/66)	11 U339	11 UZ			1000 Paris	* <b>&gt;(*</b> 13000)		
Styrene	11 U 🖎			U Market	1300 🛡		U 沙峰	
Xylene (++++++	11 U 禁	11 🖰 🐫 🗞	11	USTER	₩190000 D	1442 <b>67</b> 000	14.1	

		ORG-SB-7			. •
		1 2/04/00	1 004 100	0004/00	2/04/00
Date Sampled		6/21/93	6/21/93	6/21/93	6/21/93
Sample Number		SB7-1E	SB7-1F	SB7-2F	( SB7-2D )
Depth (ft. bgs)		20-22	25-27	25-27	15-17
Organic Traffic Report Number	EBGM1	EXR04	EXR05	EXR06	EXR07
Volatile Organics (ug/Kg)	C.F	A	CA	CA .	CA
Chloromethane	13000 U	11 U *	12 U	11 U 3 2 3 3	11
Bromomethane	13000 U	11 U.4-185	12 U	11 0 3 3	11
Vinyl Chloride	13000 U	11 U*15	12 U. 114	11 U 7	11
Chloroethane	13000 U	11 U-4-37	12 U Tes	11 U 379.3	11
Methylene Chloride	13000 BJU	11 UB(48)	12 UB 4	11 UB 1817	11
Acetone	13000 U	8 J. 1235	22 102	11 UB	11
Carbon Disulfide	13000 U	11 U 44 C	12 U 2	11 U 4/4	11
1,1-Dichloroethene	13000 U	11 U JUH SE		11 U2	11
1,1-Dichloroethane	13000 U	23	2 1	13	13
1,2-Dichloroethene (total) (23)		170	¥99	12	
Chloroform	13000 U	11 U %	12 1	11 U 200	11
1,2-Dichloroethane	13000 U	11 U	12 0 20	★ 29 <b>***</b> ***	11
2-Butanone	13000 U	11 U		11 U / 18	11
1,1,1-Trichloroethane (13 40b)	¥1600 J	79	22 2 20	57	110
Carbon Tetrachloride	13000 U	11 U 25		11 U. 11	11
Bromodichloromethane	13000 U"	11 U.A.		11 Uka 🚧	
1,2-Dichloropropane	13000 🖰 💮	11 U 200		11 U	11
cis-1,3-Dichloropropene	13000 U 💥	11 U.		11 Umaris	11
Trichloroethene (٩ρ٠)	13000 U	2 J A 4		B James B James	
Dibromochloromethane	13000 USS	11 0		11 U 2 2 2 2 3	
1,1,2-Trichloroethane	13000 U	11 U		11 U <b>NA</b>	
Benzene	13000 U358	11 U (A)		11 U 32 24 K	11
trans-1,3-Dichloropropene	13000 U	11 U \$ 10 s	12 U	11 U 48864	11
Bromoform	13000 U 😘	11 0/326	12 0 4	11 U.M.	11
4-Methyl-2-Pentanone	13000 USA	11 U. 18		3 J. W.	11
2-Hexanone	13000 U	11 U		11 U 3	
Tetrachloroethene (4ppb)	2500 مستولا	<b>₩</b> 6 JM 6	2 17 18 2		Signa - Action 18 11-15
1,1,2,2-Tetrachloroethane	13000 11301	11 U 1	12 U A	11 U 2 W 2	11
Toluene (868ppb)	14000	1 Usaa	12 UAIM	13 4 17	
Chlorobenzene	13000 U 📆	11 U 2 ik		11 U-128	
Ethylbenzene (1065)	<b>★</b> 28000	11 U 磷酸		11 以數核	
Styrene	13000 U 355	11 U	12 以整練	11 U (MA)	11
Xylene (1:435)	× 140000	11 U 3464		2 J/3 Mg	32

ORG-SB-7									
Date Sampled	1	6/22/93		6/22/93		6/22/93	\	6/22/93	
Sample Number	9	SB7-3F	1	SB7-3G	1	SB7-4E	1		
Depth (ft. bgs)		25-27		30-32	1	20-22	1	35-37	
Organic Traffic Report Number		EXR08	T	EXR09	- 1	EXR10	/	EXR11	
	1		1						
Volatile Organics (ug/Kg)	CA			CA		CA V		CA	
Chloromethane	U	12			U diameter		だ。森口	12 U	
Bromomethane	U		U, Sign		U		UMAG		
Vinyl Chloride	Uil	12	Ut JUST		UWK		U建心		
Chloroethane	U. S. Ide		ט'יש		<b>USHI</b>		の選挙	12 U 🔐	
Methylene Chloride	UB :		UB 🤼		UB:#U		UBAN	12 UB 📉	
Acetone	UB	14	BW		CITAL		UMARK	18	
Carbon Disulfide	UMANA	12	し、よび	11	U STATE		日本は	12 U 🖟 🕹	
1,1-Dichloroethene	UMHP		こななが		<b>D</b> 经基础	1400	<b>UMBER</b>	12 U	
1,1-Dichloroethane	***		ではなって	29		1400	Utwa	18	
1,2-Dichloroethene (total) (23 pb cis)	<b>新州社</b>							··· ★130	
Chloroform	Ú Z	12	のまで		UEE		U. Jej	12 U 🗱	
1,2-Dichloroethane (1996)	UMA		ころろう		OFFI		U) in the	→ <del>/</del>	
2-Butanone	U		U WI		が観察し		<b>UPPOR</b>	12 U#\$\\	
الرم 1,1,1-Trichloroethane (۱34مه)	12 M SY		(我似我)						
Carbon Tetrachloride	UMM		言語を		U AND		UMARK	12 U' 🔯	
Bromodichloromethane	U Sa Wei		U#XW		U 体操物		UHOLE	12 U 碳	
1,2-Dichloropropane	Uestar		U, die		UX		<b>UDATA</b>	12 U 🦠	
cis-1,3-Dichloropropene	United	12	りはい		U SY IT		日本の書	12 U 🔆 🕻	
Trichloroethene (400)	U to part		J. W.		J ## 3	2400	<b>建筑</b>	<b>★</b> 66	
Dibromochloromethane	U to MO		U III		子を変する		U数数		
1,1,2-Trichloroethane	U# 3/4		Uality		日本語を		U把等數	12 U 🗯	
Benzene	Until		U		しません		こなべる	12 U 豫句	
trans-1,3-Dichloropropene	U		U Sept		日本地位		こまなが	12 UTA	
Bromoform	Ux		U in All		Utati		U的激	12 U 💢	
4-Methyl-2-Pentanone	U.Tale 1		Distribu		日本社会		UX: "X	11 以有關稅	
2-Hexanone	U		U		日、温学・		UA K	12 U 😘 🤄	
Tetrachloroethene (١٩٩١)	リ語語が					<b>17000</b>		<b>★</b> 95	
1,1,2,2-Tetrachloroethane	U le la la		コンスの		UWW		OW SI	12 U 😼	
Toluene (868 ppb)			J类别		7.542%		THE STATE OF	77	
Chlorobenzene	URBA		Univid		USP		UXX 's'	12 U 👯 🤄	
Ethylbenzene	J 3.7		U		U 34 W		JUNE	9 J 🐺	
Styrene	U		U i k ? i		U.V.		Uzt 🕄	12 U 🕏 🕆	
Xylene		12	U	11	Unit	6200	<b>大学</b>	49	

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ng (t <sup>*</sup> )		<u>}</u>	1 1	1 1 1	1 1 1	
-	_	ORG-SB-7		1	- · · · · · · · · · · · · · · · · · · ·	<del>-</del>
Date Sampled	6/22/93	6/22/93	6/22/93	6/22/93	6/22/93	1
Sample Number	\$B7-5B	SB7-5E	SB7-5E(D)	SB7-6F	SB7-6H	1
Depth (ft. bgs)	5-7	20-22	20-22	25-27	35-37	1
Organic Traffic Report Number	EXR12	EXR13	EXR14	EXR15	EXR16	1
Volatile Organics (ug/Kg) CA		CA	CA	CA	CA	-1
Chloromethane	11 U	1400 U			J. 14	
Bromomethane	11 U 🐠	1400 U			JA 14	
Vinyl Chloride	11 U 4	1400			14	
Chloroethane	110 200	1400 U			14	
Methylene Chloride	11 UB 18	1400 UB			14	
Açetone	10 BJ	1400 🗸	1400	25	10	
Carbon Disulfide	11 UV42	1400 U	1400	14	14	
1,1-Dichloroethene	11 U7/15	1400 U	1400	14 (	14	
1,1-Dichloroethane	11 U.J.	1400	240	14	14	
المراد 23) [2-Dichloroethene (total) (23	5 J	¥ 1700 MM	¥ 8800 k	<b>★</b> 64	9	
Chloroform	11 U 344	1400	1400	97 <b>389</b> 1 14   1	14	
1,2-Dichloroethane	11 U 18 A	1400 以過程	1400	リシン 14 し	14	
2-Butanone	11 U	1400		JD 24 11	14	
1,1,1-Trichloroethane (134 ppb)	11 3000	<b>★</b> 5300			14	
Carbon Tetrachloride	11 U (1)	1400 以海滨			Uax 14	
Bromodichloromethane	11 U	1400 U			U 14	
1,2-Dichloropropane	11 U.A.	1400 🗓 🙀			U <b>被数据</b> 14	
cis-1,3-Dichloropropene	11 U 4 34	1400			U 14	
Trichloroethene (496)	3 0 7	<b>★</b> 630 U.S.			14	
Dibromochloromethane	11 U 666	1400 U			U. 91 U	
1,1,2-Trichloroethane	11 U 📑	1400 U	1400		14	
Benzene	11 U	1400 U		U#465 14	U 14	
trans-1,3-Dichloropropene	11 U'X	1400 US#		U 558 14	U 14	
Bromoform	11 U	1400 U.	1400	U 14	U/# 14	
4-Methyl-2-Pentanone	11 U 385	1400 U		14	U 42 14	
2-Hexanone	11 U 38	1400 UW	1400	U 14	UNIO 14	
Tetrachioroethene (٩٩٩)	<b>★</b> 29	¥ 8400 € ¥				
1,1,2,2-Tetrachloroethane	11 U *	1400 U	# 1400   1400		U 14	
Toluene (% Land)	23 4.6		₩ · • • • • • • • • • • • • • • • • • •	160866. 8	2	
Chlorobenzene	11 U	1400 以海洋			14	
Ethylbenzene (1065 (166)	2 J	520 J			14	
Styrene	11 U 3	1400 以数1			14	
Xylene	11 清雅。	3400	M 8900	88	11	

			7	ORG-SB-Z	1	1	7	
· Date Sampled		6/23/93	1	6/23/93		6/23/93		1 6/23/93
Sample Number		SB7-71		SB7-7F	1	SB7-8D	- 1	SB7-81
Depth (ft. bgs)		40-42	. [	25-27	\	15-17	1	45-47
Organic Traffic Report Number		EXR-17	1	EXR18	\	EXR19	- (	EXR20 \
S.gamoamoapo	L		+	1			-	
Volatile Organics (ug/Kg)	(	CA		CA V		CA V		CA
Chloromethane	U	56			U		日本語	1300 U
Bromomethane	U	56			U Kith A		UNA	1300 U
Vinyl Chloride	U	56			ロジが		UM	1300 U
Chloroethane	U		U		U軟機		UNIL	1300 U
Methylene Chloride	UB 👯		UB. 🖟 🚶		UB排序		UBX	1300 UB 💐
Acetone	J. M. C.	140			U		UIGH	1300 U
Carbon Disulfide	U		U President				ひまり	1300 U
1,1-Dichloroethene	U	56			口物件		数量は	1300 U
1,1-Dichloroethane	<b>U</b>		J. 🔻		日本は	27000	素素で	1300 U
1,2-Dichloroethene (total) (23,0) cis)	J. H.		<b>,如何如</b>	<b>★</b> 1970	U THE K		<b>HARRIN</b>	1300 U
Chloroform	U	56	ロッなす		ことな	27000	会学集り	1300 U
1,2-Dichloroethane	U.A.		Utite		は解析。		Ustaria	1300 U 🙉 💘
2-Butanone	Users		U		<b>U AKTAR</b>		日本の表	1300 U
1,1,1-Trichloroethane (ハコペクレン)	J		4-1-11		HERE	· 🕦 380000		→ 190 J
Carbon Tetrachloride	U		Umi		日は本学		U SE TRE	1300 U 🐠
Bromodichloromethane	U		U		UMAN		の表記を	1300 U
1,2-Dichloropropane	U		U days		U :    ! !		ロガルは	1300 U 💥
cis-1,3-Dichloropropene	U		U		U AND		気息の	1300 U
Trichloroethene (4ppb)	U	<b>★</b> 340		10000		<b>★</b> 130000		¥ 150 J
Dibromochloromethane	U. C. Sal.		U idea.		ロヤル		UVALUE	
1,1,2-Trichloroethane	U ANTA		U		の素質		日本を記	1300 U
Benzene	U		U !! A !!		U.	27000	し物域の	
trans-1,3-Dichloropropene	U		U		UK		NAME OF THE PARTY	1300 U 😘
Bromoform	U	56			UAIN		写客を	1300 U
4-Methyl-2-Pentanone	Ua 🦫 📗	56			UXXI W		U排选	1300 U 🔭
2-Hexanone	Utilities		U . It is		U缴数b	27000	は数点を	1300 U 📆
Tetrachloroethene (۲۹۹۴)	J 🛊 🍀	¥ · 920				260000		1200 نہجہ
1,1,2,2-Tetrachloroethane	Us and	56	U		山地区线		数数第四	1300 U 789/2
Toluene (848 ppb)	J project	140			金米等に			1300 U 超
Chlorobenzene	UNIX		Utility		U		Udylett	1300 U 🏥 🔻
Ethylbenzene (1065,66)	U.	120	Table 18 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		<b>阿里斯</b>		和即	200 J
Styrene	U	56			UNIV		<b>W</b> 种域	1300 以網路。/
Xylene (1143500b)	J	930	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	¥ 18000	-	<b>★</b> 180000	4 持 场	1200 J

		_	ORG-S	B-7	1	_	1	)	
Date Sampled	6/23/93	+ /	6/23/93	<del>                                     </del>	6/23/93	1	6/24/93	<del> </del>	6/24/93
Sample Number		1	SB7-9J	ŀ	SB7-10A	1 1	SB7-11D		SB7-12D
Depth (ft. bgs)	1 -	1 .	45-47	Į	5-7	[ ]	20-22		20-22
Organic Traffic Report Number	EXR21	(	EXR22	1.	EXR23	1	EXR25		EXR26
Organio Franto Franco.		<del></del>		<del></del>	1	<del></del>			
Volatile Organics (ug/Kg)	CA V	CA			CA		CA	CA	
Chloromethane	6600			U		U			12
Bromomethane	6600			U		U:+,.		Joseph A	12
Vinyl Chloride	6600			Ų		U		上線影響	12
Chloroethane	6600	United		U".		Uth		Ji 整乎	12
Methylene Chloride		UB 💮		UB:		UPART		JB 🔻 🔒	12
Acetone	6600	U		U.**		UZUZIV.	23	A STATE OF	9
Carbon Disulfide	6600			U		ÜF		January .	12
1,1-Dichloroethene		U		U 🍀 🗽		UN HE.		J Translation	12
1,1-Dichloroethane	6600	U 🌿 🔻		U		U			12
ا د ی کاهوم 1,2-Dichloroethene (total) (23م کام د د)	<b>★</b> · 7200		4	J. H.		并心机	¥€ 240 ¥	in Date	1
Chloroform	6600	U	11	U.S. 14	7100	UNIVERSE		J·斯达	12
1,2-Dichloroethane	6600	Utde		UE		U THE		J.测域	12
2-Butanone		U		רייילי ט		ON WAY		] 被标	12
اطم م ۲۰۱۹ (۱۶۹ م ۱٫۱٫۱-Trichloroethane	<b>★</b> 66000	<b>∌</b> strike		U (Ex Si	110000 🚣	THE STATE OF		ELECTION OF THE PARTY OF THE PA	21
Carbon Tetrachloride	6600			U		U++		力解釋。	12
Bromodichloromethane	6600	Ų	11	U.N.	7100	U总数		上的時間	12
1,2-Dichloropropane	6600	UNITED	11	口磁体计	7100	日発送が	12 (	J CLAP	12
cis-1,3-Dichloropropene		<b>U</b> (Market	11	U		Utility		Jawa	12
Trichloroethene (494)	58000 - يوسوس			J. W.	★ 5500	Jin a		<b>[法]</b>	3
Dibromochloromethane	6600	UNG	11	D See a		Ut:WF	12 l	J THE STATE OF	12
1,1,2-Trichloroethane	6600	U attraction	11	UW	7100	UX-X:	12 (	JEWNY	12
Benzene	6600	U		U iii	7100	UMARK	12 l	July	12
trans-1,3-Dichloropropene	6600			U	7100	日代諸学		1.排2%	12
Bromoform		U when	11	U:3 F	7100	U.f. w	12 (	Jan Ga	12
4-Methyl-2-Pentanone		U-ALT	11	Udir	7100	United	12 (	James	12
2-Hexanone		U		UW		United	12 (	J. E. S.	12
Tetrachloroethene (4p)	<b>★</b> 100000		<b>*</b> 7	日本教	<b>≯</b> ⊸16000	をより	ل 5 ⊶ہے کی ۔ ۔ ۔ ۔ 5	1-14/3 (F.	12
1,1,2,2-Tetrachloroethane		U S & S		Univ	7100	U#III	12 (	J###	12
Toluene (868)	<b>★</b> 12000			JOSEP 1	<del>×</del> 23000				1
Chlorobenzene		U		UXX	7100	世界等に	12 (	基準	12
Ethylbenzene (1065ppb)	<b>&gt;</b> 14000			(M)	<b>¥</b> 26000			LANGE OF	12
Styrene		U ., L		U SQL		Je A	12 (	1 图 图	12
Xylene (11435)	<b>⅓</b> 100000		6	J.A.	<b>★</b> 210000	The state of the s	5 J		12

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			7 (	RG-SB-7	_		_		
Date Sampled	6/24/93		6/24/93		6/24/93	6/29/93 /			
Sample Number		SB7-12D(D)	1	SB7-13E	1	BB7-13E(D)	1	SB7-14C	I = I
Depth (ft. bgs)		20-22		25-27	1 1 .		25-27		
Organic Traffic Report Number		EXR27		EXR28			EXR29		- [ ]
			•				+	EXR44	<del></del>
<u>Volatile Organics (ug/Kg)</u>	С			CA		A		CA	
Chloromethane	U	11			U	11	U	11	
Bromomethane	U	11			U		U	11	
Vinyl Chloride	U + # _		U.≱∰		UEW		UAV		U
Chloroethane	U		Ungar		A 4 St. Albandania		U	11	U
Methylene Chloride	UB 💮		UB 💛		UB 🗱		UB 🛵		U
Acetone	J				U		のははは	11	
Carbon Disulfide	UTIVE		U		U PRO		UL	11	U
1,1-Dichloroethene	UPAH		U		UFAR		UMP	11	U
1,1-Dichloroethane	U		U		U iii		U	11	U
1,2-Dichloroethene (total) (23م علم 1,2-Dichloroethene)	J'H	2	Jakins	11	U	11	James	<b>→</b> 35	
Chloroform	Unito	11	U in this	11	U产品数	11	UMMA	11	U
1,2-Dichloroethane	U/A A	11	U類類對		U XXX	11	U	11	U
2-Butanone	U' A		Ungala		U*Taken	11	U NAMED	11	U
1,1,1-Trichloroethane	44 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		相关,这		U:种成数		<b>对种</b> 机	8	J
'Carbon Tetrachloride	U		U/A (19)		U KSHQ		な数据の	11	U
Bromodichloromethane	Uited		U		U. Mark	11	U MARKE	11	U
1,2-Dichloropropane	U 💤 🖟 🖰	11	U <sub>k</sub> llight		古家など	11	U們的	11	U
cis-1,3-Dichloropropene	U		U W A S		USS		UNEM		U.
Trichloroethene (Hpb)	J. H. A.		July			,, ,, <del>, ,,,</del> ,,,, 8	ALTER AN	11	U
Dibromochloromethane			U		日本なら	11	UMPAT	11	U:
1,1,2-Trichloroethane	UNITE	11	日本産業	11	ことはもは	11	UNIX	11	U
Benzene	U.HAMA		UART	11	おおろう		UNITE	11	U. Ta
trans-1,3-Dichloropropene	U 🚁 😩		U		U. VIII		URBER	11	U##.: -
Bromoform	U ii 45		UNIVER		U:S.Xt	11	UMAGE	11	UMBETT
4-Methyl-2-Pentanone	U M		U Alle	11	U、种种的	11	人の記念		U.Y
2-Hexanone	U		UMARIL		U WAR		超機線U	11	U
Tetrachloroethene (٩٩٥)	<b>光</b> 和 是	<b>─</b> 9	J. Samon		-		. 海州州	-:: <del>16: 49</del>	10 mm
1,1,2,2-Tetrachloroethane	U transfer		U		U.S. WK		学器と		U细胞型
Toluene	Jill In	2	J.A.		JACK		とは	19	
Chlorobenzene	U****		U'd 🐰		U		Unity		U
Ethylbenzene	U		U		Uaras		USEW		UXX
Styrene	USS	11	U Tark		ロジン		U抽動物		U
Xylene	U	11	U - Trible	11	U	11	リ製造が	11	UNG

		า	ORG-S	B-7	<b>'</b>				_	_
Date Sampled	6/29/93	<del> </del>	9/23/93		9/23/93		9/24/93	$\overline{}$	9,	24/93
Sample Number	SB7-14D	1	SB7-15A		SB7-17A	\	SB7-24A	)	/ SB	7-24B
Depth (ft. bgs)	20-22	[			( )	/	l	- }	(	
Organic Traffic Report Number	EXR45	l	EXS10		EXS11		EXS12		\ E	XS13
		1	· · · · · · · · · · · · · · · · · · ·			<del></del>		<del></del>		
Volatile Organics (ug/Kg)	CA	CA			CA		CA V		CA	
Chloromethane	1300 L	Jacas		U 🗱 🗼	11 Ú		26000			11
Bromomethane	1300 L	rent to		U	11]Ü	\$ 30		U. Project		11
Vinyl Chloride	1300 U	J (Marie	11	U	11 U		26000	U illy.		11
Chloroethane	1300 L		11	U.L.	11 U		26000	U		11
Methylene Chloride (۱۹۱۵)	1300 L	1. 11.		UZ	11 0			UNIN	*	12
Acetone	1300 L	) #\$\{\bar{\bar{\bar{\bar{\bar{\bar{\ba	11	J*#	11		8400	J 1.		27
Carbon Disulfide	1300 L	J. Hall		UIP			26000	Uitis		11
1,1-Dichloroethene	1300 L	周黎:	11	Utital		ina; iri	26000	U * *		4
1,1-Dichloroethane	1300 L		11	U. A. C.	12	119-17	26000	U		190
1,2-Dichloroethene (total) (23 ملم 1,2-Dichloroethene (total)	1300 L	Jan de la		UIMIN	<b>★</b> 61 4			U 1964		9
Chloroform	1300 Ú			UHAR	11 0			יייט		11
1,2-Dichloroethane (۱۹۶)	1300 L			U				U	*	180
2-Butanone	1500 E			UNA	11 0			UJ +		13
1,1,1-Trichloroethane (۱34موم 1,1,1-Trichloroethane (۱34موم)	¥ 770 J			U++ 1	★ 280 D		360000			51
Carbon Tetrachloride	1300 L			U State of	11 U	6.716		U		11
Bromodichloromethane	1300 L			U		d att		បៈនេះ		11
1,2-Dichloropropane	1300 L			UNE		#1 (k3)		ប់ ដូចនេះ		11
cis-1,3-Dichloropropene	1300 L			UNANG		M. Maria		Untails		11
Trichloroethene (400)	1300 (			U.V.			24000	12200	*	21
Dibromochloromethane	1300 (			U		Laryy.		UMARK		11
1,1,2-Trichloroethane	1300 (			U.X		11.413		USTA		11
Benzene		J R.C.		USIL		146		U.A.V.		11
trans-1,3-Dichloropropene	1300 (			U		11.713		UNIVE		11
Bromoform	1300 (			U,*t		15 - 4° 11		U Gall		11
4-Methyl-2-Pentanone	1300 (			U.A.		1. 1. 4/2		U		82
2-Hexanone	1300 (			UL		\$75.2 F		UIXI		11
Tetrachloroethene (Yppb)	> 24000 t			U, Sales	¥ 200		→ 110000		*	22
1,1,2,2-Tetrachloroethane	1300 (			U.S. K	11 Ü			Usala		11
Toluene		JAN		UNA		性。		U		4
Chlorobenzene	1300 [			U.D	11 Ŭ			UNIL	<del></del> -	11
Ethylbenzene (١٥٤٥)	1300 (			UNCER	11 Ü		★ 15000		<del></del>	11
Styrene	1300 [			U#4.7		3.45.40		U de Mo		11
Xylene (11, 435pb)	2300			Πλ <b>.</b> γ.		Meta	→ 110000			19

				ORG-SB-7			<b>-</b> , ,		$\neg$
Date Sampled	/	10/12/93	<b></b>	10/13/93		10/14/93	7	8/17/93	
Sample Number	1 ,	SB7-19B	1	/ SB7-22D		SB7-23G		SB135F	- 1
Depth (ft. bgs)				y	- 1	1	1 1	30-32	1
Organic Traffic Report Number	\ <u>\</u>	EXT08		EXT09		EXT10		EXR70	
Volatile Organics (ug/Kg)	CA		(		c	Α	), ]	EA	<del>-}</del>
Chloromethane	U J	1400		1300			U. s.	11	U .
Bromomethane	U	1400		1300	บัสสาส		Uitrial	11	U
Vinyl Chloride	U	1400	U -	1300	U.A.		U# D	11	U
Chloroethane	U		U		UBBAR		U1 Hs	11	
Methylene Chloride (1993)			U		Ū Pingal		U		ป
Acetone		1400	U	1300	Using the second		Jan sar		J Company
Carbon Disulfide	UBARR	1400	U I	1300	United	11	UM	2	Ja
1,1-Dichloroethene	J. 3 47	1400	U	1300	U		U烘50数。	8	J :
1,1-Dichloroethane	jest the man	1400	U.S. T.		Uagas		UJA I拼,		J
1,2-Dichloroethene (total) (23ppbcis)	J. D.	1400	USSIE	<b>★</b> 10000	AN APPLIANT	11	UNION	<b>≻</b> 130	
Chloroform	U	1400	Until	1300	UNE		USHAR	11	U
1,2-Dichloroethane	理点的数数	1400	UALL	1300	UMAP		UWAN		United
2-Butanone	Sec. 10	1400	Uate	1300	U海路中		UDAR	11	U"1 + 1
1,1,1-Trichloroethane (اطمم 134)	<b>新加州教</b>	<b>¥</b> 2200		× 30000	D.W.	11	UNANG		D:).
Carbon Tetrachloride	U	1400	Ullate		UMB		UNIME		U-Million
Bromodichloromethane	U	1400	U級建立	1300	UIN	11	UI	11	U
1,2-Dichloropropane	U	1400	Unitable	1300	U	11	ULIM	11	U
cis-1,3-Dichloropropene	U	1400	U	1300	UMM		UFILE	11	USAC
Trichloroethene (4pb)	3 47 3 30	1400	U SHARE	<b>★</b> 960	J. Maria	11	UWIN	<del>X</del> 15	r'a hi t
Dibromochloromethane	U	1400	U	1300	Unite	11	の観点機口	11	<b>U</b> p-lip
1,1,2-Trichloroethane	UTIN	1400	日道数部	1300	Unidad	11	ARK NE U	11	USA
Benzene	U. P.	1400	UNIV	1300	Ualidad	11	Upper	11	Unitable
trans-1,3-Dichloropropene	Ui	1400	U West	1300	UNIT	11	Uzintak		UMARIN
Bromoform	U1	1400	U-Warn	1300	UCHEF	11	Urran		Uality (
4-Methyl-2-Pentanone	- W. W. L.	1400	U	1300	Uelten	11	U排版	11	U: Abi
2-Hexanone	U .	1400	UMAGE	1300	UHUKU	11	UENER	11	Uarsta
Tetrachloroethene (4ppb)			U Ar.				とする		139 35
1,1,2,2-Tetrachloroethane	USAN		U S.		UWW		会がご	11	Uz Statis
Toluene (868ppb)	Jacobs		J Wales		W MARKET		<b>全成公司</b>	11	U it also
Chlorobenzene	U	1400	U		以機械	11	Ulita		U
Ethylbenzene (1045 ppb)	U	<del>√-</del> .1700	CONTRACT.	→ 4400	44		UXXX		Uhring
Styrene	United	1400	U		しなって	11	Uastra!		UAKE
Xylene (11435 ()		<del>X</del> 13000	學問邦的	<del>- }</del> 19000	的物质性	11	Date:		U

		ORG-SB	.7	_	_
Date Sampled	8/19/93	8/19/93	8/20/93	8/23/93	8/24/93
Sample Number	SB134A	SB134B	/ SB134C \	SB112A	SB112B \
Depth (it. bgs)	9-11	19-21	39-41	35-37	53-55
Organic Traffic Report Number	EXR71	EXR72	EXR73	EXR74	EXR75
Volatile Organics (ug/Kg)	CA	CA	CA	CA	CA
Chloromethane	11 U	13 U	11 U 3 3 8 8		12 U
Bromomethane	11 U	<b>□ □ □ □</b> (14) (14) (16)			12 U
Vinyl Chloride	11 U	13 U 🖽 📆	35 11 U → 43 1 株		12 U
Chloroethane	11 <b>J</b> U/1000	13 U		11 ער אין	12 U
Methylene Chloride (الموم)	¥ 6 J 35 €				12 U
Acetone	10 J	94	19 40 40	17 构成数别的	7 J 🗸 💥 🤍
Carbon Disulfide	2 J				12 U
1,1-Dichloroethene	3 J 1		11 U 11 W 11 11 11 11 11 11 11 11 11 11 11 1	11 U 4 8 2	12 U
1,1-Dichloroethane	39				12 U 🧢 🖑
1,2-Dichloroethene (total)(23 منهر 33)	1300 U 👬				12 U: A.
Chloroform	11 U 11		2 J 1 1 1 1 1	11 U	12 U
1,2-Dichloroethane	11 U'E SE S				12 U
2-Butanone	11\U				12 U 😘 💯
اطم م ۱٫۱٫۱-Trichloroethane (۱۵۹ه)	¥ 580 JD 🚟 🤻				31
Carbon Tetrachloride	11 U				12 U
Bromodichloromethane	11 U				12 U
1,2-Dichloropropane	11 U				12 U
cis-1,3-Dichloropropene	11 U				12 U
Trichloroethene (4,,b)	<b>→</b> 590 UD	¥ 8 J €			12 U
Dibromochloromethane	11 0 % 条款				12 U
1,1,2-Trichloroethane (طوم 2)	<b>★</b> 4 J	→ 7J 编数			12 U
Benzene	11 0 6 6 7				12 U
trans-1,3-Dichloropropene	11 0次分配件				12 U
Bromoform	11 U	13 U			12 U
4-Methyl-2-Pentanone	11 U 2000 1				12 U
2-Hexanone	11 U				12 U
Tetrachloroethene (ゴクタb)	<b>★ 1500 D&gt;</b>	¥ 31 ≥ 31			12 U
1,1,2,2-Tetrachloroethane	11 0				12 U
Toluene	1 J		2 J J 3 6 7		12 U
Chlorobenzene	11 [0](四)[2]	13 U	器 11 U 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		12 U
Ethylbenzene	11 U	200 12 300	3 以高端。		12 U
Styrene	11 U				12 U
Xylene	11 U	1100 JD 🖄	16	11 U 200 44	12 U

# APPENDIX D DETAILED COST BACKUP

# TABLE 7-1 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

## SOURCE AREA 4 ALTERNATIVE SCS-4A: NO-ACTION (1) COST SUMMARY

Item/Description	Total Cost
CAPITAL COSTS	
TOTAL CAPITAL COSTS	\$0
ANNUAL OPERATING AND MAINTENANCE COSTS	
TOTAL ANNUAL COSTS	\$0
REPLACEMENT COSTS	
TOTAL REPLACEMENT COSTS	\$0
PRESENT WORTH ANALYSIS	
Total Capital Costs (from above)	\$0
Present Worth Annual O&M Costs	\$0
Present Worth Replacement Costs	\$0
TOTAL PRESENT WORTH	\$0

<sup>(1)</sup> The No Action alternative for Area 4 soils is a true "no-action" - no additional measures, which incur cost, will be taken for this alternative.

#### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4 ALTERNATIVE SCS-4A: NO-ACTION (1) DETAILED COST ESTIMATE

		<u>'</u>			Construction/		Start-up &
					Installation	Annual O&M	Baseline
COST COMPONENT	Unit	No. Units	<b>Unit Cost</b>	Capital Cost	Costs	Costs	Costs
NONE	N/A	N/A	N/A	N/A	N/A	N/A	N/A

<sup>(1)</sup> The No Action alternative for Area 4 soils is a true "no-action" - no additional measures, which incur cost, will be taken for this alternative.

#### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4 ALTERNATIVE SCS-4A: NO-ACTION (1) DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
NONE	N/A

(1) The No Action alternative for Area 4 soils is a true "no-action" - no additional measures, which incur cost, will be taken for this alternative.

# TABLE 7-2 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

### SOURCE AREA 4 ALTERNATIVE SCS-4B: LIMITED ACTION - DEED RESTRICTIONS COST SUMMARY

item/Description	Total Cost
CAPITAL COSTS	
Deed Restrictions (land use)	\$25,000
SUBTOTAL CONSTRUCTION COSTS (1)	\$25,000
Bid and Scope Contingency (10%)	\$2,500
TOTAL CAPITAL COSTS	\$28,000
ANNUAL OPERATING AND MAINTENANCE COSTS	
None	\$0
TOTAL ANNUAL COSTS	\$0
REPLACEMENT COSTS	
None	\$0
TOTAL REPLACEMENT COSTS (2)	\$0
PRESENT WORTH ANALYSIS	
Total Capital Costs (from above) (3)	\$28,000
Present Worth Annual O&M Costs (4)	\$0
Present Worth Replacement Costs	\$0
TOTAL PRESENT WORTH	\$28,000

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs - N/A for this alternative.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years. N/A for this alternative.

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4 ALTERNATIVE SCS-4B: LIMITED ACTION - DEED RESTRICTIONS DETAILED COST ESTIMATE

						Construction		Start-up &
				•		Installation	Annual O&M	Baseline
COST COMPONENT		Unit	No. Units	Unit Cost	Capital Cost	Costs	Costs	Costs
<b>原於国民共和国共和国共和国共和</b>	21		.1			1	1	
	legal fees	le.	1	\$25,000	\$25,000			

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4 ALTERNATIVE SCS-48: LIMITED ACTION - DEED RESTRICTIONS DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS	
Paradarah dipirah sahir sahir s		
legal fees Based o	n CDM experience	

# TABLE 7-3 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

### SOURCE AREA 4 ALTERNATIVE SCS-4C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	General	\$3,000
	Soil Vapor Extraction (with emission controls)	\$206,000
	Catalytic Oxidation System	\$134,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$343,000
	Bid Contingency (10%)	\$34,000
	Scope Contingency (10%)	\$34,000
	Engineering and Design (15%)	\$51,000
	Oversight/Health and Safety (5%)	\$17,000
	TOTAL CAPITAL COSTS	\$479,000
	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Post Treatment Sampling	\$18,000 \$22,000 \$63,160 \$32,000
	TOTAL ANNUAL COSTS	\$135,160
REPLACEMENT (	COSTS	
	None	\$0
	TOTAL REPLACEMENT COSTS (2)	\$0
	والمستقل والمستور	
PRESENT WORT	H ANALYSIS	
PRESENT WORT	H ANALYSIS  Total Capital Costs (from above) <sup>(3)</sup>	\$479,000
PRESENT WORT	Total Capital Costs (from above) (3)	
PRESENT WORT		\$479,000 \$1,677,000 \$0

- (1) Capital costs for construction items do not include oversight fees, which are accounted for separately.
- (2) Replacement costs include construction and oversight capital costs.
- (3) Capital costs represent the present worth of the given alternative.
- (4) Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years.

#### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4 ALTERNATIVE SCS-4C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION DETAILED COST ESTIMATE

					Construction/		Start-up &
					Installation	Annual O&M	Baseline
COST COMPONENT	Unit	No. Units	<b>Unit Cost</b>	Capital Cost	Costs	Costs	Costs
35)(C)(1)		د که		\$3,000	150:	2318,300 E	<u>. 90.</u>
construction trailer (rental and delivery)	yr	1	\$3,300			\$3,300	
mobilization	ls	1	\$1,000	\$1,000			
demobilization	ls	1	\$1,000	\$1,000			
decon facilities	68.	1	\$1,000	\$1,000			
health and safety equipment	yr	1	\$9,000			\$9,000	·
electrical power service supply	yr	1	\$3,600			\$3,600	
water supply	yr	1	\$2,400			\$2,400	
SOFT IN COMPANY SECTION FOR PARTY AND ADMINISTRATION OF THE COMPANY AND AD				Jabres .	32831	241242	
SVE well installation	<b>68</b> .	3	\$6,000		\$18,000		_
SVE main system	ls	1	\$14,000	\$14,000	\$5,000	\$10,000	
SVE control panels	ls	1	\$3,000	\$3,000	\$1,000	\$500	
6" carbon steel piping	R	210	\$57	\$11,970			
4* carbon steel piping	ft	110	\$32	\$3,520			
excevation for piping placement	ft	320	\$0.67		\$214		
electrical power requirements (10 HP)	yr.	1	\$10,000			\$10,000	
SVE treatment building	sf	800	\$180	\$144,000	included		
ein/water separator tank	ls	1	\$5,000	\$5,000		\$1,000	
Chargean Carata and a second				3880	·		1
Catalytic Oxidation Unit	ls	1	\$134,000	\$134,000	included	\$10,000	
Natural Gas	ls	1	\$7,000			\$7,000	
Catalyst Replacement	68.	9	\$7,200			\$2,160	
Sampling	68.	8	\$5,500			\$44,000	
के प्रारंभी नेपाल हत्य जेन अकादाना !		1		30	10	\$33,000	1
Test Kits/ Field Screening (per year)	samples	11	\$300			\$3,300	
Laboratory Analysis (VOCs, N, P) (per year)	samples	131	\$200			\$26,200	
shipping and handling (per year)	shipmt	24	\$100			\$2,400	

<sup>(1)</sup> All Post Treatment Sampling costs are presented in costs per number of samples and shipments required per year - costs are presented as annual O&M costs

#### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4 ALTERNATIVE SCS-4C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
(5):-	
construction trailer (rental and delivery)	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
mobilization	Heavy equipment and trailers, per vendor estimate
demobilization	Allowance for trailer and equipment demobilization
decon fecilities	Based on level of personal and vehicle decontamination anticipated for this alternative
health and safety equipment	Allowance based on CDM equipment rates
to the contract of the contrac	
SVE well installation	Cost associated with installation of SVE wells. Based on CDM experience.
[	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator,
	condensate transfer pump, high condens, level alarm, vac. relief valve, vac. gauges, skid mnting,
1	interconnecting piping and a manual motor start switch
•	Vendor estimate - NEEP (May 1998)
<b>T</b> ''	Based on CDM experience
	Based on CDM experience
• • • • • • • • • • • • • • • • • • •	12" wide trench and backfill, 36" deep as per 1996 Means
	Based on expected electrical costs per month for this alternative
	Based on expected use per month for this alternative (e.g., decon, personnel use)
	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
	Basic prefabricated building on concrete pad. Based on CDM experience.
Section Control • Fix (#Fix) (Fix) (Fix)	
	Vendor estimate - Global Technologies, Inc (May 2000)
	Vendor estimate - Global Technologies, Inc (May 2000)
	Vendor estimate - Global Technologies, Inc (May 2000)
	Based on CDM experience
ANT SCHOOL STORY OF EX	
	Based on CDM experience and average test kit costs - ~25 samples per test kit; samples
Test Kits/ Field Screening (per year)	collected on a grid of 1 sample/250 cy contam. mat1; 1 sampling grid per 2 weeks
	Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of 1
	sample/250cy contam. material; 1 sampling grid per month (including QA/QC samples)
shipping and handling (per year)	Costs associated with transporting samples from site to laboratory twice per month

# TABLE 7-4 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

### SOURCE AREA 4 ALTERNATIVE SCS-4D: EXCAVATION AND ON-SITE THERMAL TREATMENT COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	General	\$46,000
	Excavation / On-Site Thermal Treatment	\$694,000
	Excavation Dewatering	\$397,000
	Post Treatment Sampling	\$9,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$1,146,000
	Bid Contingency (15%)	\$172,000
	Scope Contingency (15%)	\$172,000
	Engineering and Design (15%)	\$172,000
	Oversight/Health and Safety (5%)	\$57,000
	TOTAL CAPITAL COSTS	\$1,719,000
	General Maintenance of Thermal Treatment System	
	General Maintenance of Thermal Treatment System	\$0
	TOTAL ANNUAL COSTS	<u></u>
REPLACEMENT C	TOTAL ANNUAL COSTS	
REPLACEMENT C	TOTAL ANNUAL COSTS	\$0
	TOTAL ANNUAL COSTS  OSTS  TOTAL REPLACEMENT COSTS (2)	\$0 \$0
	TOTAL ANNUAL COSTS  OSTS  TOTAL REPLACEMENT COSTS (2)	\$0
	TOTAL ANNUAL COSTS  OSTS  TOTAL REPLACEMENT COSTS (2)  I ANALYSIS  Total Capital Costs (from above) (3)	\$0
REPLACEMENT C	TOTAL ANNUAL COSTS  OSTS  TOTAL REPLACEMENT COSTS (2)	\$0 \$0 \$1,719,000

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% annual discount rate over a project life of 2 months.

#### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4 ALTERNATIVE SCS-4D: EXCAVATION AND ON-SITE THERMAL TREATMENT DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ installation Costs	Annual O&M	Start-up & Baseline Costs
Section 1	Oint	140. 01110	Olar Occi	XXXXX	30	30	
construction trailer (rental and delivery)	mo	2	\$275	\$550	<u> </u>		
mobilization	18	1 7	\$10,000	\$10,000			
demobilization	18	1 1	\$10,000	\$10,000			
decen trailer	- 00	1 1	\$5,000	\$5,000			
vehicle decon station		1 1	\$10,000	\$10,000			
vehicle decon equipment	68	1	\$570	\$570			
health and safety equipment	mo	2	\$4,500	\$9,000		<del>-</del>	
electrical power service supply	mo	2	\$400	\$800			
dust central	mo	2	8230	\$460			
mobilization/demobilization	ls	1	\$23,500	\$23,500			
ped for steging	le	1	\$10,000	\$10,000			
temporary enclosure (rental - 86' wide by 200' long)	mo	2	\$9,563	\$19,126	\$60,000		
excevation	ton	8,064	\$5.00	\$40,320			
eoil treatment	ton	3,815	\$53.00	\$202,195			
becidit and compaction	ton	8,064	\$2.00	\$16,128			
water supply (10 GPM)	mo	2	\$1,500	\$3,000			
sheet plling	M	400	3800	\$320,000			
		•			. 101.15		
Completely furnish, install, operate, and remove system: well points spaced 20" O.C.	mo	1	\$200,000		\$200,000		
enstytical	betch	39	\$1,000	\$39,000			
T&D cost (15 GPM produced)	gallon	777,800	\$0.20	\$155,520			
rental of (2) 21,000 gallon tanks	mo	2	\$1,000	\$2,000			
							,
Analytical for Volatile Organic Compounds (soils)	08	44	\$200	\$8,800			
shipping and handling	08	4	\$50	\$200			

In general, a bulk density of 1.4 tons/yd³ was assumed for soils material - this conversion was used for conversion of pricing giving per ton, where volume of material is given in yd³.

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4 ALTERNATIVE SCS-4D: EXCAVATION AND ON-SITE THERMAL TREATMENT DETAILED COST ESTIMATE - COMMENTS

construction trailer (rental and delivery)  mobilization demobilization demobilization decon trailer vehicle decon station vehicle decon equipment health and safety equipment health and safety equipment electrical power service supply dust control  Water truck per 1996 Means  Water truck per 1996 Means  Water truck per 1996 Means	COST COMPONENT	COMMENTS
Heavy equipment and trailers, per vendor estimate decon trailer decon station vehicle decon equipment health and safety equipment electrical power service supply dust control  Transportation of the Indirect Heat and Volatilization unit (IHV), frontfoader, and the time involve for set-up and tear-down (vendor estimate) pad for staging pad for st	Franke, Mr.	
Allowance for trailer and equipment demobilization decon trailer Allowance based on CDM equipment rates vehicle decon equipment health and safety equipment Allowance based on CDM equipment rates Steam cleaning and water tank per 1996 Means Allowance based on CDM equipment rates description power service supply Based on expected electrical costs per month for this alternative dust control  Transportation of the Indirect Heat and Volatilization unit (IHV), frontioader, and the time involve for set-up and tear-down (vendor estimate) pad for steigne per description of the Indirect Heat and Volatilization unit (IHV), frontioader, and the time involve for set-up and tear-down (vendor estimate)  Sprung Instant Structure - vendor estimate; Scravation cost (vendor estimate) Sprung Instant Structure - vendor estimate; Scravation cost (vendor estimate) Sprung Instant Structure - vendor estimate; Scravation cost (vendor estimate)  To GPM is needed for operation of the thermal treatment system (4,800 gpd if run for 8hrs/day); costs based on construction site water average per 1996 Means - typical steel sheets, approx. 4' x 40' around perimeter of excavation; as per CDM experience  TAD cost (15 GPM produced) TAD cost (15 GPM produced) Invited for Volatile Organic Compounds (soils)  Based on CDM Experience  Analytical for Volatile Organic Compounds (soils)  Based on CDM Experience  Analytical for Volatile Organic Compounds (soils)  Based on CDM Experience	construction trailer (rental and delivery)	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
decon trailer vehicle decon station vehicle decon station vehicle decon equipment selectrical power service supply dust control  mobilization/demobilization pad for staging p	mobilization	Heavy equipment and trailers, per vendor estimate
vehicle decon station vehicle decon station vehicle decon equipment	demobilization	Allowance for trailer and equipment demobilization
vehicle decon equipment health and safety equipment. Allowance based on CDM equipment rates electrical power service supply dust control.  **Record of the Indirect Heat and Volatilization unit (IHV), front/oader, and the time involve for set-up and tear-down (vendor estimate).  **Transportation of the Indirect Heat and Volatilization unit (IHV), front/oader, and the time involve for set-up and tear-down (vendor estimate).  **Pad size approx. 2007:200' crushed stone or asphalt (vendor estimate).  **Pad size approx. 2007:200' crushed stone or asphalt (vendor estimate).  **Excavation cost (vendor estimate).  **Excavation cost (vendor estimate).  **Excavation cost (vendor estimate).  **Excavation cost (vendor estimate).  **Vendor Estimate for Direct Fired Low Temperature Thermal Desorption (includes providing a loader and operator to place contaminated soil into the cold feed bin and for restockpiling the cle processed soil);  **Backfill and compaction of clean soil from stockpiling (vendor estimate).  **Transportation cost (vendor estimate).  **Transportation cost (vendor estimate).  **Description cost (vendor estimate).  **Processed soil);  **Backfill and compaction of clean soil from stockpiling (vendor estimate).  **Transportation of the thermal treatment system (4,800 gpd if run for 8hrs/day);  **oosts based on construction site water average per 1996 Means - typical.  **Steel sheets, approx. 4' x 40' around perimeter of excavation; as per CDM experience.  **Completely furnish, install, operate, and remove system.**  **well points specied 27 O.C.  **Based on CDM Experience.  **TaD cost (15 GPM produced).  **Based on CDM Experience.  **Based on CDM Experience.  **Based on CDM Experience.  **Analytical for Volatile Organic Compounds (soils).  **Based on CDM Experience.  **Analytical for Volatile Organic Compounds (soils).  **Based on CDM Experience.  **Analytical for Volatile Organic Compounds (soils).  **Based on CDM Experience.**  **Analytical for Volatile Organic Compounds (soils).  **Based on CDM Experience.	decon trailer	Allowance based on CDM equipment rates
Allowance based on CDM equipment rates electrical power service supph dust control  Water truck per 1996 Means  Transportation of the Indirect Heat and Volatilization unit (IHV), frontioader, and the time involve for set-up and tear-down (vendor estimate) ped for steping Ped size approx. 2007:200' crushed stone or asphalt (vendor estimate) Excavation cost (vendor estimate) Sprung Instant Structure - vendor estimate; Excavation cost (vendor estimate)  Excavation cost	vehicle decon station	20'x20' gravel pad over 11 mil plastic with plywood and joist deck per 1996 Means
mobilization/demobilization fransportation of the Indirect Heet and Volatilization unit (IHV), frontloader, and the time involve for set-up and tear-down (vendor estimate) pad for steping pa	vehicle decon equipment	Steam cleaning and water tank per 1996 Means
mobilization/demobilization mobilization/demobilization mobilization/demobilization pad for staging pad for st	health and safety equipment	Allowance based on CDM equipment rates
Transportation of the Indirect Heat and Volatilization unit (IHV), frontloader, and the time involve for set-up and tear-down (vendor estimate)  Pad size approx. 200°x200° crushed stone or asphalt (vendor estimate)  Sprung Instant Structure - vendor estimate; constr/install, costs include labor and heavy equip.  Excavation cost (vendor estimate)  Vendor Estimate for Direct Fired Low Temperature Thermal Desorption (includes providing a loader and operator to place contaminated soil into the cold feed bin and for restockpiling the cle processed soil);  Backfill and compaction of clean soil from stockpiting (vendor estimate)  10 GPM is needed for operation of the thermal treatment system (4,800 gpd if run for 8hrs/day); costs based on construction of the thermal treatment system (4,800 gpd if run for 8hrs/day); costs based on construction site water average per 1996 Means - typical steel sheets, approx. 4° x 40° around perimeter of excavation; as per CDM experience  Completely furnish, install, operate, and remove system well points specied 20° oC.  Based on CDM Experience  Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)	electrical power service supply	Based on expected electrical costs per month for this alternative
Transportation of the Indirect Heat and Volatilization unit (IHV), frontloader, and the time involve for set-up and tear-down (vendor estimate)  pad for staging pad for stagi	dust control	Water truck per 1996 Means
Transportation of the Indirect Heat and Volatilization unit (IHV), frontloader, and the time involve for set-up and tear-down (vendor estimate) Pad size approx. 2007x200 crushed stone or asphalt (vendor estimate) Sprung Instant Structure - vendor estimate; constr/install. costs include labor and heavy equip. Excavation cost (vendor estimate) Vendor Estimate for Direct Fired Low Temperature Thermal Desorption (includes providing a loader and operator to place contaminated soil into the cold feed bin and for restockpiling the cle processed soil);  beddill and compection water supply sheet piling sheet piling sheet piling sheet piling steel sheets, approx. 4' x 40' around perimeter of excavation; as per CDM experience  TaD cost (15 GPM produced) rental of (2) 21,000 gation tanks  Based on CDM Experience  Analytical for Volatile Organic Compounds (soils)  Based on 1998 sample analysis costs from Midwest Laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)	المراجع والمراجع	
temporary enclosure (rental - 88' wide by 200' long)  Excevation cost (vendor estimate)  Vendor Estimate for Direct Fired Low Temperature Thermal Desorption (includes providing a loader and operator to place contaminated soil into the cold feed bin and for restockpiling the cle processed soil);  Backfill and compaction of clean soil from stockpiling (vendor estimate)  10 GPM is needed for operation of the thermal treatment system (4,800 gpd if run for 8hrs/day); costs based on construction site water average per 1996 Means - typical steel sheets, approx. 4' x 40' around perimeter of excavation; as per CDM experience  Completely Armish, Install, operate, and remove system, well points epecied 20' O.C analytical Based on CDM Experience  TaD cost (15 GPM produced)  TaD cost (15 GPM produced)  Pad size approx. 200'x200' crushed stone or asphalt (vendor estimate).  Completely Armish, Install, operate, and remove system, well points epecied 20' O.C analytical for Volatile Organic Compounds (soils).  Based on CDM Experience  TaD cost (15 GPM produced)  Pad size approx. 200'x200' crushed stone or asphalt (vendor estimate).  Completely Armish, Install, operate, and remove system.  Well points epecied 20' O.C analytical for Volatile Organic Compounds (soils).  Based on CDM Experience  Analytical for Volatile Organic Compounds (soils).  Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples).	Promise to a	
for set-up and tear-down (vendor estimate) Pad size approx. 200'x200' crushed stone or asphalt (vendor estimate) Sprung Instant Structure - vendor estimate; constr/install. costs include labor and heavy equip. Excavation cost (vendor estimate) Vendor Estimate for Direct Fired Low Temperature Thermal Desorption (includes providing a soil treatment processed soil); becidil and compection Backfill and compaction of clean soil from stockpiling (vendor estimate)  10 GPM is needed for operation of the thermal treatment system (4,800 gpd if run for 8hrs/day); costs based on construction site water average per 1996 Means - typical steel sheets, approx. 4' x 40' around perimeter of excavation; as per CDM experience  10 Completely furnish, Install, operate, and remove system well points epeced 20' O C analytical  11 Tab cost (15 GPM produced) Based on CDM Experience  12 Tab cost (15 GPM produced) Based on CDM Experience  13 Based on CDM Experience  14 Analytical for Volatile Organic Compounds (soils) Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)		Transportation of the Indirect Heat and Volatilization unit (IHV), frontloader, and the time involved
ped for staging temporary enclosure (rental - 88' wide by 20' long) excavation (vendor estimate). Sprung Instant Structure - vendor estimate; constr/install, costs include labor and heavy equip. Excavation cost (vendor estimate). Vendor Estimate for Direct Fired Low Temperature Thermal Desorption (includes providing a loader and operator to place contaminated soil into the cold feed bin and for restockpiling the cle processed soil);  backfill and compaction water supply safety processed soil;  Backfill and compaction of clean soil from stockpiling (vendor estimate)  10 GPM is needed for operation of the thermal treatment system (4,800 gpd if run for 8hrs/day); costs based on construction sits water average per 1998 Means - typical steel sheets, approx. 4' x 40' around perimeter of excavation; as per CDM experience  Completely Arrish, Install, operate, and remove system well points speced 20' O'C analysical TaD cost (15 GPM produced) Resed on CDM Experience  TaD cost (15 GPM produced) Resed on CDM Experience  Analytical for Volatile Organic Compounds (soils)  Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)	mobilization/demobilization	for set-up and tear-down (vendor estimate)
Sprung Instant Structure - vendor estimate; constr/install, costs include labor and heavy equip.  Excavation cost (vendor estimate)  Vendor Estimate for Direct Fired Low Temperature Thermal Description (includes providing a loader and operator to place contaminated soil into the cold feed bin and for restockpiling the cle processed soil);  becidit and compection  water supply  Table costs and remove system well points speced 20' O.C.  analytical  Table cost (15 GPM produced)  Table cost (15 GPM produced)  Table cost (2) 21,000 gation tanks  Analytical for Volatile Organic Compounds (soils)  Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)	ped for staging	
Vendor Estimate for Direct Fired Low Temperature Thermal Desorption (includes providing a loader and operator to place contaminated soil into the cold feed bin and for restockpiling the cle processed soil);  Backfill and compection of clean soil from stockpiling (vendor estimate)  10 GPM is needed for operation of the thermal treatment system (4,800 gpd if run for 8hrs/day); costs based on construction sits water average per 1996 Means - typical steel sheets, approx. 4' x 40' around perimeter of excavation; as per CDM experience  Completely furnish, install, operate, and remove system well points speed 20' O.C. analytical TAD cost (15 GPM produced) rental of (2) 21,000 gation tartis.  Based on CDM Experience  Based on CDM Experience  Based on CDM Experience  Based on CDM Experience  Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)		
Vendor Estimate for Direct Fired Low Temperature Thermal Desorption (includes providing a loader and operator to place contaminated soil into the cold feed bin and for restockpiling the cle processed soil);  Backfill and compection of clean soil from stockpiling (vendor estimate)  10 GPM is needed for operation of the thermal treatment system (4,800 gpd if run for 8hrs/day); costs based on construction sits water average per 1996 Means - typical steel sheets, approx. 4' x 40' around perimeter of excavation; as per CDM experience  Completely furnish, install, operate, and remove system well points speed 20' O.C. analytical TAD cost (15 GPM produced) rental of (2) 21,000 gation tartis.  Based on CDM Experience  Based on CDM Experience  Based on CDM Experience  Based on CDM Experience  Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)		<u> </u>
soil treatment loader and operator to place contaminated soil into the cold feed bin and for restockpiling the cle processed soil);  beckfill and compection water supply supply the supply sup		Vendor Estimate for Direct Fired Low Temperature Thermal Desorption (includes providing a
processed soil); Backfill and compaction of clean soil from stockpiting (vendor estimate)  10 GPM is needed for operation of the thermal treatment system (4,800 gpd if run for 8hrs/day); costs based on construction site water average per 1996 Means - typical steel sheets, approx. 4' x 40' around perimeter of excavation; as per CDM experience  Completely furnish, Install, operate, and remove system: well points speed 20' O.C. analytical  TAD cost (15 GPM produced) rental of (2) 21,000 gallon tants  Based on CDM Experience	soil treatment	
beckfill and compection of clean soil from stockpiting (vendor estimate)  10 GPM is needed for operation of the thermal treatment system (4,800 gpd if run for 8hrs/day); costs based on construction site water average per 1996 Means - typical steel sheets, approx. 4' x 40' around perimeter of excavation; as per CDM experience  Completely furnish, Install, operate, and remove system well points speed 20' O.C. analytical  TAD cost (15 GPM produced) rental of (2) 21,000 gallon tanks  Analytical for Volatile Organic Compounds (soils)  Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)		, , ,
water supply sheet pling  Completely furnish, Install, operate, and remove system well points speed 20' O.C. sheet of CDM Experience  Based on vendor estimate - MoreTrench American (June 1998); System operation 24 hours/day well points speed 20' O.C. sheetylased on CDM Experience  TAD cost (15 GPM produced) rental of (2) 21,000 gation tanks  Analytical for Volatile Organic Compounds (soils)  Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)	backfill and compaction	Control of the contro
costs based on construction site water average per 1996 Means - typical steel sheets, approx. 4' x 40' around perimeter of excavation; as per CDM experience  Completely furnish, install, operate, and remove system: well points speced 20' O.C. analytical TAD cost (15 GPM produced) rental of (2) 21,000 gation tanks  Analytical for Volatile Organic Compounds (solis)  Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)		
Steel sheets, approx. 4' x 40' around perimeter of excavation; as per CDM experience  Completely furnish, install, operate, and remove system well points speced 20' O.C. analytical days/week with diesel pumps.  Based on CDM Experience  T&D cost (15 GPM produced) Based on CDM Experience  rental of (2) 21,000 gation tanks  Based on CDM Experience  Analytical for Volatile Organic Compounds (solls)  Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)	water supply	· · · · · · · · · · · · · · · · · · ·
Completely furnish, Install, operate, and remove system well points speced 20' O.C. days/week with diesel pumps.  Based on CDM Experience  T&D cost (15 GPM produced)  Pental of (2) 21,000 gation tanks  Based on CDM Experience  Based on CDM Experience  Based on CDM Experience  CDM Experience  Based on CDM Experience  Based on CDM Experience  Based on CDM Experience  Based on CDM Experience  Analytical for Volatile Organic Compounds (solls)	sheet niling	
Completely furnish, install, operate, and remove system: well points speced 20' O.C. analytical Based on CDM Experience TAD cost (15 GPM produced) rental of (2) 21,000 gallon tanks  Based on CDM Experience	,	
well points speced 20' O.C. days/week with diesel pumps.  analytical Based on CDM Experience  TaD cost (15 GPM produced) Based on CDM Experience  rental of (2) 21,000 gallon tanks Based on CDM Experience  Analytical for Volatile Organic Compounds (solls)  Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)	ولا التعاري وينتهو والتراويونية تتناث والمواجعة	
well points speced 20' O.C. days/week with diesel pumps.  analytical Based on CDM Experience  TaD cost (15 GPM produced) Based on CDM Experience  rental of (2) 21,000 gallon tanks Based on CDM Experience  Analytical for Volatile Organic Compounds (solls)  Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)	Completely furnish instell operate and remove system	Based on vendor estimate - MoreTrench American (June 1998); System operation 24 hours/day
Analytical for Volatile Organic Compounds (solls)  Based on CDM Experience  Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)		
T&D cost (15 GPM produced) Resed on CDM Experience Based on CDM Experience Based on CDM Experience  Analytical for Volatile Organic Compounds (solls) Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)		
rental of (2) 21,000 gation tanks  Based on CDM Experience  Analytical for Volatile Organic Compounds (soils)  Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)	-	
Analytical for Volatile Organic Compounds (solls)  Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)	• • • • • • • • • • • • • • • • • • • •	
Analytical for Volatile Organic Compounds (solls)  Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of sample/250cy; 1 sampling grid per month (including QA/QC samples)		The second section is a second
Analysical for Volable Organic Compounds (soils) sample/250cy; 1 sampling grid per month (including QA/QC samples)		Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of
	Analytical for Volatile Organic Compounds (soils)	
	chinging and handling	

# TABLE 7-5 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

### SOURCE AREA 7 ALTERNATIVE SCS-7A: NO-ACTION (1) COST SUMMARY

Item/Description	Total Cost
CAPITAL COSTS	
Tatu 0.05	•
TOTAL CAPITAL COSTS	\$0
ANNUAL OPERATING AND MAINTENANCE COSTS	
TOTAL ANNUAL COSTS	\$0
REPLACEMENT COSTS	
TOTAL REPLACEMENT COSTS	\$0
PRESENT WORTH ANALYSIS	
Total Capital Costs (from above)	\$0
Present Worth Annual O&M Costs	\$0
Present Worth Replacement Costs	\$0
TOTAL PRESENT WORTH	\$0

<sup>(1)</sup> The No Action alternative for Area 7 soils is a true "no-action" - no additional measures, which incur cost, will be taken for this alternative.

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 7
ALTERNATIVE SCS-7A: NO-ACTION (1)
DETAILED COST ESTIMATE

					Construction/	<del></del>	Start-up &
COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Installation Costs	Annual O&M Costs	Baseline Costs
NONE	N/A	N/A	N/A	N/A	N/A	N/A	N/A

<sup>(1)</sup> The No Action alternative for Area 7 soils is a true "no-action" - no additional measures, which incur cost, will be taken for this alternative.

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 7 ALTERNATIVE SCS-7A: NO-ACTION (1) DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
NONE	N/A

(1) The No Action alternative for Area 7 soils is a true "no-action" - no additional measures, which incur cost, will be taken for this alternative.

# TABLE 7-6 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

# SOURCE AREA 7 ALTERNATIVE SCS-7B: LIMITED ACTION - PARK DEMOLITION, ACCESS AND DEED RESTRICTIONS COST SUMMARY

Item/Description	Total Cost
CAPITAL COSTS	
Access Restrictions (fencing and signs)	\$34,000
Park Demolition	\$10,000
Deed Restrictions (land use)	\$25,000
SUBTOTAL CONSTRUCTION COS	TS <sup>(1)</sup> \$69,000
TOTAL CAPITAL CO	OSTS \$69,000
ANNUAL OPERATING AND MAINTENANCE COSTS	
Signs and Fence Maintenance	\$200
TOTAL ANNUAL CO	STS \$200
REPLACEMENT COSTS	
Access Restrictions (fencing and signs) (every 2 ye	ears)\$34,000
TOTAL REPLACEMENT COST	TS <sup>(2)</sup> \$34,000
PRESENT WORTH ANALYSIS	100 m
Total Capital Costs (from above) (3)	\$69,000
Present Worth Annual O&M Costs (4)	\$2,000
Present Worth Replacement Costs	\$204,000
TOTAL PRESENT WO	PRTH \$275,000

- (1) Capital costs for construction items do not include oversight fees, which are accounted for separately.
- (2) Replacement costs include construction and oversight capital costs.
- (3) Capital costs represent the present worth of the given alternative.
- (4) Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years.

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 7 ALTERNATIVE SCS-7B: LIMITED ACTION - PERK DEMOLITION, ACCESS AND DEED RESTRICTIONS DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
						27	
security fence (perimeter w/ 10% contingency)	linear feet	2580	\$12.60	\$32,508	included in cap.		
edd for corner poets, 3° diem., gelv. steel	each	4	\$90.50	\$362			
edd for 3' wide gate	each	2	\$240	\$480			
eigns (reflective with warnings, clip to fence)	eech	7	\$25,00	\$175		\$175	
basistball count, tennis court, and playground	to .	1	\$10,000	\$10,000			
1							
legal fees	le		\$25,000	\$25,000			

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 7 ALTERNATIVE SCS-7B: LIMITED ACTION - PARK DEMOLITION ACCESS AND DEED RESTRICTIONS DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
transfer of the second	
security fence (perimeter w/ 10% contingency)	6' high plus 3 strand berbed wire, 2" line post @ 10' O.C., 1-5/8" top rail; 9 ga. wire galv. steel; 1996 Meens; Note: Labor/Installation cost included under capital cost.
add for corner poets, 3" diam., galv. steel	3" diam., galv. steel; as per 1996 Means
and for 3' wide cate	Gate for 6' high fence 1-5/6" frame 3' wide gaty, steel: as per 1996 Means
signs (reflective with warmings)	Reflective w/ warming message attached to fence - placement every 500 feet - per 1998 Lab Safety Catalogue
, 1	
basksiball court, tennis courts, and playground	Based on CDM experience
logal fees	Based on CDM experience

# TABLE 7-7 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

# SOURCE AREA 7 ALTERNATIVE SCS-7C: EXCAVATION AND ON-SITE BIOLOGICAL TREATMENT/ RECREATIONAL FACILITIES REPLACEMENT COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	General	\$35,000
	Ex-Situ Biological Treatment	\$4,574,000
	Excavation Dewatering	\$5,396,000
	Recreational Facilities Replacement	\$90,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$10,095,000
	Bid Contingency (15%)	<b>\$1,514,00</b> 0
	Scope Contingency (20%)	\$2,019,000
	Engineering and Design (15%)	\$1,514,000
	Oversight/Health and Safety (5%)	\$505,000
	TOTAL CAPITAL COSTS	\$15,647,000
ANNUAL OPERA	TING AND MAINTENANCE COSTS	
ANNUAL OPERA	TING AND MAINTENANCE COSTS  General Fence Maintenance Post Treatment Sampling	\$6,000 \$200 \$621,000
ANNUAL OPERA	General Fence Maintenance	\$200
ANNUAL OPERA	General Fence Maintenance Post Treatment Sampling TOTAL ANNUAL COSTS	\$200 \$621,000
	General Fence Maintenance Post Treatment Sampling TOTAL ANNUAL COSTS COSTS	\$200 \$621,000
	General Fence Maintenance Post Treatment Sampling TOTAL ANNUAL COSTS	\$200 \$621,000
REPLACEMENT (	General Fence Maintenance Post Treatment Sampling  TOTAL ANNUAL COSTS  COSTS  TOTAL REPLACEMENT COSTS (2)	\$200 \$621,000 \$627,000
REPLACEMENT (	General Fence Maintenance Post Treatment Sampling  TOTAL ANNUAL COSTS  COSTS  TOTAL REPLACEMENT COSTS (2)	\$200 \$621,000 \$627,000
REPLACEMENT (	General Fence Maintenance Post Treatment Sampling  TOTAL ANNUAL COSTS  COSTS  TOTAL REPLACEMENT COSTS (2)	\$200 \$621,000 \$627,000 \$0
	General Fence Maintenance Post Treatment Sampling  TOTAL ANNUAL COSTS  COSTS  TOTAL REPLACEMENT COSTS (2)  H ANALYSIS  Total Capital Costs (from above) (3)	\$200 \$621,000 \$627,000 \$0 \$15,647,000

- (1) Capital costs for consternation items do not include oversight fees, which are accounted for separately.
- (2) Replacement costs include construction and oversight capital costs.
- (3) Capital costs represent the present worth of the given alternative.
- (4) Present worth of annual O&M costs is based on a 7% discount rate over a life of 5 years.

#### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE-UNIT - AREA 7 ALTERNATIVE SCS-7C: EXCAVATION AND ON-SITE BIOLOGICAL TREATMENT/ RECREATIONAL FACILITIES REPLACEMENT DETAILED COST ESTIMATE

		<del></del>		r	Construction		Start-up &
				ł	Installation	Annuai O&M	Baseline
COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Costs	Costs	Costs
		1131 (111-12)				1900	- U
construction trailer (rental and delivery)	ΥT	1	\$275			\$275	
mobilization	ls ls	1	\$10,000	\$10,000			
demobilization	15	1	\$10,000	\$10,000			
decon trailer	60	1	\$5,000	\$5,000			
vehicle decon station	60	1	\$10,000	\$10,000			
health and safety aguipment	yr	<del>  i  </del>	\$570	V.0,000		\$570	
electrical power service supply	yr	i	\$4,500			\$4,500	
water supply	yr yr	1	\$400			\$400	
dust control	yr yr	1	\$230			\$230	
and the state of t		·	<b>V</b> 235	187/871		7.7	
security fence (perimeter w/ 10% contingency)	linear feet	2580	\$12.60	\$32,508		\$200	
Mobilization/ Site Preparation/ Final Grading	ls.	1		\$300,000			
Blooke w/ Mising	Gy .	57,009	\$86.00	\$3,762,594			
encavation	ton	95,856	\$5.00	\$479,276	<del></del>		
				24,41212			
and the second s				11000	- 242 M		
Completely furnish, install, operate, and remove system:		1		A. F (A.)			· · · · · · · · · · · · · · · · · ·
well points spaced 20' O.C. (year 1)	mo	11	\$450,000		\$4,950,000	- 1	
analytical	betch	85	\$1,000	\$85,000		,	
T&D cost (10 GPM produced)	gallon	1,684,800	\$0.20	\$336,960			
rental of (2) 21,000 gallon tents	FRO	24	\$1,000	\$24,000			
						175. 1	
Test Kits/ Field Screening (per year)	samples	237	\$300			\$71,100	
Laboratory Analysis (VOCs, N, P) (per year)	samples	2736	\$200			\$547,200	
shipping and handling (per year)	shipmt	24	\$100			\$2,400	
				53000		1	1
PLAYGROUND	F	LAYGROUP	VD.				
bike rack, 10' long, permanent	00	1	\$370	\$370	included		
climber, arch, 6' high	68	1	\$505	\$505	included	1	
horizontal monkey ladder, 14' long	60	1	\$670	\$670	included		
modular playground, platform, two levels	60	1	\$2,100	\$2,100	included	· · · · · · · · · · · · · · · · · · ·	<del></del>
component, attached to platform	00	1	\$825	\$825	included		
component, linked between platforms	00	2	\$560	\$1,120	included		
perellel bers, 10' long	00	1	\$425	\$425	included		
slide, stainless steel bed, 12' long, 6' high	60	1	\$970	\$970	included		
swings, 6' high, plain seats, 4 seats	00	1	\$885	\$885	included		
pee gravel bees (1' thick)	Cy	450	\$46.50	\$20,925	included		
railroad ties (6"x6") around perimeter	R	415	\$6.60	\$2,739	included		
TENNIS COURTS	TE	NNIS COU	राड				
termis court complete (w/ fence and asphaltic conc.)	court	2	\$25,000	\$50,000	included	<u>-</u>	
BASKETBALL COURT	BAS	KETBALL C	OURT				
heckstops, steel, single pole	60	2	\$705.00	\$1,410	included		
asphaltic concrete pevernent, binder coarse, 3" thick	sy	1066	\$5.40	\$5,751	included		
pavement base (prepare and roll sub-base)	sy	1065	\$1.27	\$1,353	included		

In general, a bulk density of 1.4 tons/yd² was assumed for soits material.

<sup>(1)</sup> All Post Treatment Sampling costs are presented in costs per number of samples and shipments required per year - costs are presented as annual O&M costs

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 7 ALTERNATIVE SCS-7C: EXCAVATION AND ON-SITE BIOLOGICAL TREATMENT/ RECREATIONAL FACILITIES REPLACEMENT DETAILED COST ESTIMATE - COMMENTS

COMMENTS
50x12' construction trailer - \$1.66iml delivery fee (100ml) - rental allowence per 1995 Means
Heavy equipment and trailers, per vendor estimate
Allowence for trailer and equipment demobilization
Allowance based on CDM equipment rates
20x20' gravel pad over 11 mil plastic with plysrood and joist dack per 1996 Means
Allowence based on CDM equipment rates
Steam cleaning and water tank per 1996 Means
Based on expected electrical costs per month for this alternative
Water truck per 1986 Means
Based on CDM experience
Based on COM experience
Excernation cost (vendor estimate)
Based on vendor estimate - More Trench American (June 1998); System operation 24 hours/de
days/week with diesel pumps.
Based on CDM Experience
Beeed on CDM Experience
Beged on COM Experience
Based on COM experience and everage test lift costs - ~25 samples per test kit; samples
collected on a grid of 1 sample/250 cy contam. matt; 1 sampling grid per 2 weeks
Based on 1996 sample analysis costs from Midwest Laboratories; samples collected on a grid of
sample/250cy contam. meterial; 1 sampling grid per month (including QA/QC samples)
Costs sesociated with transporting samples from alte to laboratory twice per month
As per 1996 Meens, Playfield Equipment
As per 1906 Meens, Playfield Equipment As per 1906 Meens, Playfield Equipment
As per 1996 Means, Playfield Equipment; As per 1996 Means, Playfield Equipment; treated pine/metal, 10'x12'
As per 1996 Means, Playfield Equipment, treased pinermeda, 10x12.  As per 1996 Means, Playfield Equipment
As per 1995 Means, Playfield Equipment
As per 1996 Means, Playfield Equipment
As per 1996 Means, Playfield Equipment
As per 1996 Means, Playfield Equipment
kas kas asaa usaa ah a sahabasa edada sasa
As per 1998 Means, Trees/Plants/Ground Court
As per 1996 Means, Trees/Plants/Ground Cover
As per 1996 Meens, Curbs
As per 1996 Meens, Curbs
As per 1996 Means, Curbs As per 1996 Means, Athletic Pave/Surfacing
As per 1996 Means, Curbs As per 1996 Means, Athletic Pave/Surfacing
As per 1996 Means, Curbs As per 1996 Means, Athletic Pave/Surfacing

# TABLE 7-8 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

#### **SOURCE AREA 7**

### ALTERNATIVE SCS-7D: CONTAMINATED SOILS EXCAVATION AND ON-SITE THERMAL TREATMENT / RECREATIONAL FACILITIES REPLACEMENT COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	General	\$36,000
	Contaminated Soils Excavation / On-Site Thermal Treatment	\$6,683,000
	Excavation Dewatering	\$4,029,000
	Recreational Facilities Replacement	\$90,000
	Post Treatment Sampling	\$366,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$11,204,000
	Pid Contingency (40%)	\$1 120 000
	Bid Contingency (10%) Scope Contingency (10%)	\$1,120,000 \$1,120,000
	Engineering and Design (10%)	\$1,120,000 \$1,120,000
	Oversight/Health and Safety (5%)	\$1,120,000 \$560,000
	Oversignumealth and Salety (5%)	\$300,000
	TOTAL CAPITAL COSTS	\$15,124,000
ANNUAL OPERATI	NG AND MAINTENANCE COSTS	
ANNUAL OPERATI	NG AND MAINTENANCE COSTS  General  General Maintenance of Thermal Treatment System	
ANNUAL OPERATI	General	\$20,000
	General General Maintenance of Thermal Treatment System TOTAL ANNUAL COSTS	\$65,000 \$20,000 \$85,000
	General General Maintenance of Thermal Treatment System TOTAL ANNUAL COSTS	\$20,000 \$85,000
REPLACEMENT CO	General General Maintenance of Thermal Treatment System  TOTAL ANNUAL COSTS  DSTS  TOTAL REPLACEMENT COSTS (2)	\$20,000 \$85,000
REPLACEMENT CO	General General Maintenance of Thermal Treatment System  TOTAL ANNUAL COSTS  DSTS  TOTAL REPLACEMENT COSTS (2)  ANALYSIS	\$20,000 \$85,000 \$0
REPLACEMENT CO	General General Maintenance of Thermal Treatment System  TOTAL ANNUAL COSTS  DSTS  TOTAL REPLACEMENT COSTS (2)  ANALYSIS  Total Capital Costs (from above) (3)	\$20,000 \$85,000 \$0 \$15,124,000
REPLACEMENT CO	General General Maintenance of Thermal Treatment System  TOTAL ANNUAL COSTS  DSTS  TOTAL REPLACEMENT COSTS (2)  ANALYSIS	\$20,000 \$85,000 \$0

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% discount rate over a project life of 8 months.

## SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 7 ALTERNATIVE SCS-7D: CONTAMINATED SOILS EXCAVATION AND ON-SITE THERMAL TREATMENT / RECREATIONAL FACILITIES REPLACEMENT DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
(c) 57 - 15				35 (70)	S [6]	53.550	Ŧ)
construction trailer (rental and delivery)	уr	1	\$3,300			\$3,300	
mobilization	18	1	\$10,000	\$10,000			
demobilization	18	1	\$10,000	\$10,000			
decon trailer	68	1	\$5,000	\$5,000	-		
vehicle decon station	60	1	\$10,000	\$10,000			
vehicle decon equipment	68	1	\$570	\$570			
health and safety equipment	yr	1	\$54,000			\$54,000	·
electrical power service supply	yr	1	\$4,800			\$4,800	
dust control	уr	1	\$2,800			\$2,600	
المراجع المراجع المراجع والمراجع والمراجع				2002		2: 1:10	
mobilization/damobilization	is	1	\$23,500	\$23,500			
pad for staging	ls.	1	\$10,000	\$10,000			
temporary enclosure (rental - 85' wide by 200' long)	mo	8	\$9,563	\$76,504	\$60,000		
excevation	ton	95,855	\$5	\$479,276			
soil treatment	ton	79,813	\$53	\$4,230,068		\$20,000	
beckfill and compaction	ton	95,855	\$2	\$191,710			
water supply (10 GPM)	mo	8	\$1,500	\$12,000			
sheet piling	R	2,000	\$800	\$1,600,000			
Completely furnish, install, operate, and remove					_	1	
system: well points speced 20" O.C.	mo	8	\$450,000		\$3,600,000		
analytical	batch	84	\$1,000	\$84,000			
T&D cost (10 GPM produced)	gallon	1,684,800	\$0.20	\$336,960			
rental of (2) 21,000 gallon tanks	mo	8	\$1,000	\$8,000			
Maria Charles and Artificial Company of the Company				5.08/0	11	<u> </u>	
PLAYGROUND	<i>F</i>	LAYGROUN					
blike rack, 10' long, permanent	68	1	\$370	\$370	included		
climber, arch, 6' high	- 69	1	\$505	\$505	included		
horizontal monkey ledder, 14' long	- 68	1	\$670	\$670	included	ļļ	
modular playground, platform, two levels	68	1	\$2,100	\$2,100	included		
component, attached to platform	<u> </u>	1	\$825	\$825	included	ļļ.	
component, linked between platforms	- 68	2	\$560	\$1,120	included		
perallel bars, 10' long	68	1	\$425	\$425	included		
slide, stainless steel bed, 12' long, 6' high	68	1	\$970	\$970	included		
ewings, 8" high, plain seats, 4 seats	68	1	\$885	\$865	included		
pee gravel base (1' thick)	9	450	\$46.50	\$20,925	included		
railroad ties (6"x8") around perimeter	ft	415	\$6.60	\$2,739	included		
TENNIS COURTS		NNIS COUR			<del></del>	L	
tennis court complete (w/ fence and asphaltic conc.)	court	2	\$25,000	\$50,000	included		
BASKETBALL COURT		KETBALL CO					
backstope, steet, single pole	68	2	\$705.00	\$1,410	included		
asphaltic concrete pevement, binder coerse, 3" thick	<b>s</b> y	1065	\$5.40	\$5,751	included		
pevernent base (prepare and roll sub-base)	sy	1065	\$1.27	\$1,353	included		
Make the Company of t				Zak Sale!	. 2		<u></u>
Analytical for Volatile Organic Compounds (soils)	88	1824	\$200	\$384,800			
shipping and handling	88	16	\$50	\$800			

In general, a bulk density of 1.4 tons/yd² was assumed for soils material.

#### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 7 ALTERNATIVE SCS-7D: CONTAMINATED SOILS EXCAVATION AND ON-SITE THERMAL TREATMENT / RECREATIONAL FACILITIES REPLACEMENT

#### DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
Carrier to the trailer to the delication of the trailer to the tra	ECV-17 construction brillian C1 SELimi delluggy for (100m) construction and 1000 to
	50'x12' construction trailer - \$1.65/ml delivery fee (100ml) - rental allowance per 1996 Means
	Heavy equipment and trailers, per vendor estimate
	Allowance for trailer and equipment demobilization
	Allowance based on CDM equipment rates
	20'x20' gravel ped over 11 mil plastic with plywood and joist deck per 1996 Means
	Steam cleaning and water tank per 1996 Means
• • •	Allowance based on CDM equipment rates
, , , , , , , , , , , , , , , , , , , ,	Steam cleaning and water tank per 1996 Means
dust control	Water truck per 1996 Meens
Entra of the Control	
200 (7 11 11 11 11 11 11 11 11 11 11 11 11 11	Transportation of the Indirect Heat and Volatilization unit (IHV), frontloader, and the time involved
mobilization/demobilization	for set-up and teer-down (vendor estimate)
ned for eterion	Pad size approx. 200'x200' crushed stone or asphalt (vendor estimate)
	Sprung Instant Structure - vendor estimate; constr/install, costs include labor and heavy equip.
	Excavation cost (vendor estimate)
EXCEPTEDO!	Vendor Estimate for Direct Fired Low Temperature Thermal Description (includes providing a
anii traatment	loader and operator to place contaminated soil into the cold feed bin and for restockpiling the clear
SON DESCRIPTION	processed soil);
hankin and same arises	
DECKIN and compaction	Backfill and compaction of clean soil from stockpiling (vendor estimate)  10 GPM is needed for operation of the thermal treatment system (4,800 gpd if run for 8hrs/day);
	· · · · · · · · · · · · · · · · · · ·
	costs based on construction site water average per 1996 Means - typical
sneet plang	Steel sheets, approx. 4' x 40' around perimeter of excavation; as per CDM experience
i. Storymu miryen ya ka eseri na mayayaran	
	Based on vendor estimate - MoreTrench American (June 1998); System operation 24 hours/day,
	days/week with diesel pumps.
	Based on CDM Experience
	Based on CDM Experience
	Based on CDM Experience
The second field the field of t	
PLAYGROUND	
bike rack, 10' long, permanent	As per 1996 Means, Playfield Equipment
•	As per 1996 Means, Playfield Equipment
· · · · · · · · · · · · · · · · · · ·	As per 1996 Means, Playfield Equipment
modular playground, platform, two levels	As per 1996 Means, Playfield Equipment; treated pine/metal, 10'x12'
	As per 1996 Means, Playfield Equipment
	As per 1996 Means, Playfield Equipment
• • • • • • • • • • • • • • • • • • • •	As per 1996 Means, Playfield Equipment
	As per 1996 Means, Playfield Equipment
	As per 1996 Means, Playfield Equipment
9 . 9 .	As per 1996 Means, Trees/Plants/Ground Cover
railroad ties (6"x8") around perimeter	As per 1996 Means, Curbs
TENNIS COURTS	
tennis court complete (w/ fence and asphaltic conc.)	As per 1996 Means, Athletic Pave/Surfacing
BASKETBALL COURT	
	As per 1996 Means, Playfield Equipment
asphaltic concrete pevernent, binder coerse, 3° thick	As per 1996 Meens, Walk/Rd/Parking Paving
pevernent base (prepare and roll sub-base)	Ne her 1880 weetle, availatoron skind Lindal Anni
pevernent base (prepare and roll sub-base)	As per 1990 meets, weatong-raining raining
San Land Anna Carlos Company	Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of 1

## TABLE 7-9 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FOCUSED FEASIBILITY STUDY

#### **SOURCE AREA 7**

ALTERNATIVE SCS-7E: SOIL VAPOR EXTRACTION (SVE)/AIR SPARGING (AS) ALONG SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS / CATALYTIC OXIDATION COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	Groundwater Use Restrictions	\$25,00
	General	\$167,00
	Leachate Monitoring Wells	\$120,00
	VRS/Catalytic Oxidation System	\$976,00
	Air Sparging	\$694,00
	SUBTOTAL CONSTRUCTION COSTS (1)	\$1,982,00
	Bid Contingency (15%)	\$297,00
	Scope Contingency (20%)	\$396,00
	Engineering and Design (15%)	\$297,00
	Oversight/Health and Safety (5%)	\$99,00
	TOTAL CAPITAL COSTS	\$3,071,00
ANNUAL OPERATII	NG AND MAINTENANCE COSTS	
	General	\$24,00
	VRS Regular Maintenance/Electrical	\$63,00
	Leachate Sampling and Analysis (per event)	\$28,00
	Catalytic Oxidation Maintenance	\$109,00
	Regular System Maintenance/Electrical	\$96,00
	TOTAL ANNUAL COSTS	\$320,000
REPLACEMENT CO	STS	
	Leachate Monitoring Wells (every 15 years)	\$29,000
	Equipment Replacement (e.g., motors, blowers) -	
	every 15 years	\$30,00
	TOTAL REPLACEMENT COSTS (2)	\$59,000
PRESENT WORTH	ANALYSIS	
	Total Capital Costs (from above) (3)	\$3,071,00
	Present Worth Annual O&M Costs (4)	\$2,051,000
	Leachate Sampling	,-
	Quarterly Sampling - years 1 and 2	\$207,00
	Semi-annual Sampling - years 3 through 10	\$295,00
	Present Worth Replacement Costs (5)	S
	r resent vvoidi Nepiacement Costs	<u> </u>

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% discount rate over 10 years.

<sup>(5)</sup> Present worth of replacement costs is based on a 7% annual discount rate and no replacement of leachate monitoring wells and system equipment.

# SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 7 ALTERNATIVE SCL-7E: SOIL VAPOR EXTRACTION (SVE)/AIR SPARGING (AS) ALONG GMZ BOUNDARY AND SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS / CATALYTIC OXIDATION DETAILED COST ESTIMATE

					Construction/ Installation	Annual O&M	Start-up & Baseline
COST COMPONENT	Unit	No. Units	Unit Cost		Costs	Costs	Costs
Regal Rese			425,000	28,000	. <u> </u>		
read and	İs	1	\$25,000	\$25,000	20600		.,
construction trailer (rental and delivery)	mo	3	\$275	\$825	Add the	. 1233201.	33935
mobilization	is .	1	\$1,000	\$1,000			
demobilization	18	<del>                                     </del>	\$1,000	\$1,000			
decon facilities		1 1	\$1,000	\$1,000		<b></b>	
health and selety equipment	mo	3	\$2,000	\$6,000		\$24,000	
electrical power service connection	is.	1 - 1	\$5,000	\$5,000		\$24,000	
electrical power service auggly	mo	3	\$400	\$1,200			
water auguly	mo	3	\$200	\$600		<del></del>	·
Pilot Scale Study	ls.	1	\$150,000	\$60,000	\$40,000	<del></del>	\$50,000
			4.55,555	1	200		<b>400,000</b>
Leachate - monitoring well installation and materials	well	5	\$6,000		\$30,000	Г	
Performance Monitoring well installation and materials	well	15	\$6,000		\$90,000		
And the second of the second o							
tinta say og ser				1.00		21.00	
labor	hours	40	\$60			\$2,400	
vehicle	day	2	\$60			\$120	
equipment	ls .	1	\$600			\$600	
miscellaneous	ls .	1	\$1,000			\$500	
Leachele laboratory analysis	each	20	\$230			\$4,600	
questorly reports	each	4	\$5,000			\$20,000	
la fighti mittill forti i i gi arrigi i si fill i gigla forti				. 229an	3124.E	ingel	CELOUIL
VRS well installation	68.	16	\$6,000		\$96,000		
VRS main system	is	2	\$50,000	\$100,000	\$20,000	\$20,000	\$25,000
VRS control panels	ls	2	\$10,000	\$20,000	\$1,000	\$4,000	
6" carbon steel piping	ft	3000	\$57	\$171,000		\$5,000	
4" carbon aleef piping	R	500	\$32	\$16,000		\$3,200	
excevation for piping placement	<u> </u>	3500	\$4.41		\$15,435		
electrical power requirements (10 HP)	yr.	11	\$20,000			\$20,000	
VRS treatment building	<u> </u>	1200	\$180	\$216,000	included		
air/water separator tank	<u>ls</u>	2	\$10,000	\$20,000		\$4,000	
air/water separator tank - condensate disposal	gel	260	\$25			\$8,500	
			2072 005	7070	la el eda d	240.000	
Catalytic Oxidation Unit	<u> </u>	1	\$276,000	\$276,000	included	\$10,000	
Netural Gas	ls	1	\$43,800	<del></del>		\$43,800	
Catalyst Replacement	- 66	3	\$38,400	<u> </u>		\$11,520 \$44,000	
Sampling   Sampling   Sampling	00	_ <u> </u>	\$5,500	\$1,000			315,50
AS well installation		57	\$6,000	L A Section of the	\$342,000	F1250	C. C. C. C.
	<u> </u>	1	\$100,000	\$100,000	\$20,000	\$20,000	\$25,000
AS main system AS control panels	la la	1	\$3,000	\$3,000	\$1,500	\$600	923,000
• • • • • • • • • • • • • • • • • • • •	<u> </u>	3000	\$5,000 \$57	\$171,000	\$1,500	\$34,200	
6" carbon ateel piping 4" carbon ateel piping	- <del></del>	500	\$32	\$16,000		\$3,200	
excevation for piging placement		3500	\$4,41	\$10,000	\$15,435	\$3,200	
condensate disposal	gel	520	\$25	<del>  </del>	<b>410,100</b>	\$13,000	
electrical power requirements (25 HP)	Aee.	1	\$25,000	<del>                                     </del>		\$25,000	
AS treatment building		<u> </u>		commenceding VRS	<del> </del>	722,550	
* )							
air/water separator tank	Chair for aire.	ة مطوعهمهم يعلم			5		

# SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 7 ALTERNATIVE SCL-7E: SOIL VAPOR EXTRACTION (SVE)/AIR SPARGING (AS) ALONG GMZ BOUNDARY AND SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS / CATALYTIC OXIDATION DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
programme and the control of the con	
ingel foce	Cost based on CDM experience
<b>C</b> *	
construction trailer (rental and delivery)	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
•	Heavy equipment and trailers, per vendor estimate
	Allowance for trailer and equipment demobilization
	Based on level of personal and vehicle decontamination anticipated for this alternative
	Allowance based on CDM equipment rates
electrical power service connection	
·	Based on expected electrical costs per month for this alternative
	Based on expected use per month for this elternative (e.g., decon, personnel use)
	Depart of expected day per moral for this estationary (e.g., decont, personner use)
	Cost based on CDM experience in monitoring well installation
Performance monitoring well installation and materials	Cost based on CDM experience in monitoring wall installation
labor	Based on 10 hour work day at the average CDM labor rate of \$80 for oversite personnel
	Based on \$300/week rental fee for a field vehicle
· ·	Based on CDM equipment rental rates
miscellaneous	incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
	Based on average cost incurred for VOC analysis: One duplicate and one blank will be collected per 10
leachate laboratory analysis	
	Carry Co.
	Cost associated with installation of SVE wells. Based on CDM experience.
77.5 11.5 11.5 11.5 11.5 11.5 11.5 11.5	Vendor: Includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator, condensate
	transfer pump, high condens. level slarm, vac. relief valve, vac. gauges, skid mounting, interconnecting piping
VRS main system	and a manual motor start switch
	Vendor estimate - NEEP (May 1998)
	Based on CDM experience
	Based on CDM experience
	12" wide trench and backfill, 48" deep as per 2000 Means
	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
•	Basic prefabricated building on concrete pad. Based on CDM experience.
•	Based on CDM experience
•	
air/water separator tank - condensate disposal	Based on CDM experience
Record of the second of the second of	
	Vendor estimate - Global Technologies, Inc (May 2000)
	Vendor estimate - Global Technologies, Inc (May 2000)
	Vendor estimate - Global Technologies, Inc (May 2000)
	Based on CDM experience
Mean paratian	
AS well installation	Cost associated with installation of AS wells. Based on CDM experience.
AS main system	Vendor: includes blower, exp motor, inline silencer, pressure relief valve, unitized base, pressure gauge and
7.0 11.001	a manual motor starting switch.
•	Vendor estimate
6" cerbon steel piping	Based on CDM experience
4" cerbon steel piping	Based on CDM experience
excavation for piping placement	12" wide trench and backfill, 48" deep as per 2000 Means
condensate disposal	Based on CDM experience
electrical power requirements (25 HP)	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
AS treatment building	Costs for AS treatment building included with corresponding VRS
air/water separator tank	Costs for air/water separator tank included with corresponding VRS
cetalytic exidetion treatment	Costs for calalytic exidation treatment included with corresponding VRS

# TABLE 7-10 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

### SOURCE AREA 9/10 ALTERNATIVE SCS-9/10A: NO-ACTION (1) COST SUMMARY

Item/Description	Total Cost
CAPITAL COSTS	
TOTAL CAPITAL COSTS	\$0
ANNUAL OPERATING AND MAINTENANCE COSTS	
TOTAL ANNUAL COSTS	\$0
REPLACEMENT COSTS	
TOTAL REPLACEMENT COSTS	\$0
PRESENT WORTH ANALYSIS	
Total Capital Costs (from above)	\$0
Present Worth Annual O&M Costs	\$0
Present Worth Replacement Costs	\$0
TOTAL PRESENT WORTH	\$0

<sup>(1)</sup> The No Action alternative for Area 9/10 soils is a true "no-action" - no additional measures, which incur cost, will be taken for this alternative.

#### TABLE 7-9 ALTERNATIVE SCS-9/10A: NO-ACTION (1) DETAILED COST ESTIMATE

					Construction/	Start-up &	
					Installation	Annual O&M	Baseline
COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Costs	Costs	Costs
NONE	N/A	N/A	N/A	N/A	N/A	N/A	N/A

<sup>(1)</sup> The No Action alternative for Area 9/10 soils is a true "no-action" - no additional measures, which incur cost, will be taken for this alternative.

#### TABLE 7-9 ALTERNATIVE SCS-9/10A: NO-ACTION (1) DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT		COMMENTS
NONE	NA	

(1) The No Action alternative for Area 9/10 soils is a true "no-action" - no additional measures, which incur cost, will be taken for this alternative.

# TABLE 7-11 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

### SOURCE AREA 9/10 ALTERNATIVE SCS-9/10B: LIMITED ACTION - DEED RESTRICTIONS COST SUMMARY

Item/Description	Total Cost
CAPITAL COSTS	
Deed Restrictions (land use)	\$25,000
SUBTOTAL CONSTRUCTION COSTS (1	\$25,000
Bid and Scope Contingency (10%)	\$2,500
TOTAL CAPITAL COSTS	\$28,000
ANNUAL OPERATING AND MAINTENANCE COSTS	
None	
TOTAL ANNUAL COSTS	\$0
REPLACEMENT COSTS	
None	
TOTAL REPLACEMENT COSTS (2	\$0
PRESENT WORTH ANALYSIS	
Total Capital Costs (from above) (3)	\$28,000
Present Worth Annual O&M Costs (4)	\$0
Present Worth Replacement Costs	\$0
TOTAL PRESENT WORTH	\$28,000

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years.

### TABLE 7-10 ALTERNATIVE SCS-9/10B: LIMITED ACTION - DEED RESTRICTIONS DETAILED COST ESTIMATE

				Construction/			Start-up &
COST COMPONENT	Unit	No. Units	Linit Cost	Capital Cost	Installation Costs	Annual O&M Costs	Baseline Costs
Design of the state of the stat	O III	NO. OTHER	Cont Coat	\$25,000		Costs	00013
legal fees				\$25,000			

### TABLE 7-10 ALTERNATIVE SCS-9/10B: LIMITED ACTION - DEED RESTRICTIONS DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
TENNON CONTRACTOR	
legal feee Based on CDM experience	

# TABLE 7-12 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

## SOURCE AREA 9/10 ALTERNATIVE SCS-9/10C: SOIL VAPOR EXTRACTION (SVE) COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	General	\$3,000
	Soil Vapor Extraction (w/ emission controls)	\$158,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$161,000
	Bid Contingency (10%)	\$16,000
	Scope Contingency (10%)	\$16,000
	Engineering and Design (15%)	\$24,000
	Oversight/Health and Safety (5%)	\$8,000
	TOTAL CAPITAL COSTS	\$225,000
ANNUAL OPERAT	TING AND MAINTENANCE COSTS	-
	General	\$18,000
	Regular System Maintenance/Electrical	\$164,000
	Post Treatment Sampling	\$147,000
	TOTAL ANNUAL COSTS	\$329,000
REPLACEMENT O	COSTS	
	None	
	TOTAL REPLACEMENT COSTS (2)	\$0
PRESENT WORTH	H ANALYSIS	· · · · · · · · · · · · · · · · · · ·
	Total Capital Costs (from above) (3)	\$225,000
	Present Worth Annual O&M Costs (4)	\$4,083,000
	Present Worth Replacement Costs	\$0

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years.

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 9/10 ALTERNATIVE SCS-9/10C: SOIL VAPOR EXTRACTION (SVE) DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ installation Costs	Annual O&M Costs	Start-up & Baseline Costs
CNC A				35.00		ALSEE.	
construction trailer (rental and delivery)	mo	1	\$3,300			\$3,300	
mobilization	is	1	\$1,000	\$1,000			
demobilization	15	1	\$1,000	\$1,000			
decon facilities	ea	1	\$1,000	\$1,000			
health and safety equipment	yr	1	\$9,000			\$9,000	
electrical power service supply	yr	1	\$3,600			\$3,600	
water supply[	yr	1	\$2,400			\$2,400	
one ty service and including the polymer				372-10	Sycial.	313300	
SVE well installation	68	4	\$6,000		\$24,000		-
SVE main system	unit	1	\$18,000	\$18,000	\$6,000	\$10,000	
SVE control panels	unit	1	\$3,000	\$3,000	\$1,500	\$500	•
6" carbon steel piping	ft	720	\$57	\$41,040			
4" carbon steel piping	ft	50	\$32	\$1,600			
excevation for piping placement	ft	770	\$0.67		\$516		
electrical power requirements (25 HP)	ls.	1	\$25,000			\$25,000	
SVE treatment building	sf	500	\$100	\$50,000	included		
air/water separator tank	ls	1	\$5,000	\$5,000		\$500	
activated carbon emissions treatment	ls	1	\$7,500	\$7,500		\$1,000	
activated carbon recharge (1,600 lb recharge)	year	30	\$1,640			\$49,200	
ectivated carbon disposal	year	30	\$2,190			\$65,700	
Sampling	68	8	\$1,500			\$12,000	
THE TOTAL CONTRACT OF SERVICE OF THE PROPERTY		, .		裁	. <u>2</u> . ,	. अधाराध्य	<u> </u>
Test Kits/ Field Screening (per year)	samples	34	\$300			\$10,200	
Leboratory Analysis (VOCs, N, P) (per year)	samples	672	\$200			\$134,400	
shipping and handling (per year)	shipmt	24	\$100			\$2,400	

<sup>(1)</sup> All Post Treatment Sampling costs are presented in costs per number of samples and shipments required per year - costs are presented as annual O&M costs

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 9/10 ALTERNATIVE SCS-9/10C: SOIL VAPOR EXTRACTION (SVE) DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
(c) company	
construction trailer (rental and delivery)	50'x12' construction trailer - \$1.65/mi delivery fee (100ml) - rental allowance per 1996 Means
mobilization	Heavy equipment and trailers, per vendor estimate
demobilization	Allowance for trailer and equipment demobilization
decon facilities	Based on level of personal and vehicle decontamination anticipated for this alternative
health and safety equipment	Allowance based on CDM equipment rates
electrical power service supply	Based on expected electrical costs per month for this alternative
water supply	Based on expected use per month for this alternative (e.g., decon, personnel use)
STATE OF THE COMPANY THAT IS STATED	
SVE well installation	Cost associated with installation of SVE wells. Based on CDM experience.
	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator,
SVE main system	condensate transfer pump, high condens. level alarm, vac. relief valve, vac. gauges, skid mnting,
	interconnecting piping and a manual motor start switch
SVE control penels	Vendor estimate - NEEP (May 1998)
6" carbon steel piping	based on CDM experience
	based on CDM experience
	12" wide trench and backfill, 36" deep as per 1996 Means
	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
=	Basic prefabricated building on concrete pad. Based on CDM experience.
eir/water separator tank	Based on CDM experience
activated carbon emissions treatment	Based on estimate from Carbtrol (6/98) for a G-7 Absorber carbon unit w/ 1600 lbs of vapor phase
	activated carbon designed for 2000 cfm flows.
	Based on carbon use of 3 lb/day and 365 days/yr, rate of \$1.50/lb carbon recharge
-	Based on carbon used per 365 day/year, disposal at a rate of \$2.00 per lb carbon disposed
	Based on CDM experience
(A.C. ten Ph. S. Art. Survey Managember	<u>kan ngangangan nganggan ngang</u>
	Based on CDM experience and average test kit costs - ~25 samples per test kit; samples
Test Kits/ Field Screening (per year).	collected on a grid of 1 sample/250 cy contam. mat1; 1 sampling grid per 2 weeks
	Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of 1
	sample/250cy contam. material; 1 sampling grid per month (including QA/QC samples)
shipping and handling (per year)	Costs associated with transporting samples from site to laboratory twice per month

# TABLE 7-13 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

## SOURCE AREA 11 ALTERNATIVE SCS-11A: NO-ACTION (1) COST SUMMARY

Item/Description	Total Cost
CAPITAL COSTS	
TOTAL CAPITAL COSTS	\$(
ANNUAL OPERATING AND MAINTENANCE COSTS	
TOTAL ANNUAL COSTS	\$(
REPLACEMENT COSTS	
TOTAL REPLACEMENT COSTS	\$0
PRESENT WORTH ANALYSIS	
Total Capital Costs (from above)	\$0
Present Worth Annual O&M Costs	\$(
Present Worth Replacement Costs	\$0
TOTAL PRESENT WORTH	\$0

<sup>(1)</sup> The No Action alternative for Area 11 soils is a true "no-action" - no additional measures, which incur cost, will be taken for this alternative.

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 11 ALTERNATIVE SCS-11A: NO-ACTION (1) DETAILED COST ESTIMATE

					Start-up &		
					Installation	Annual O&M	Baseline
COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Costs	Costs	Costs
NONE	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(1) The No Action alternative for Area 11 soils is a true "no-action" - no additional measures, which incur cost, will be taken for this alternative.

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 11 ALTERNATIVE SCS-11A: NO-ACTION (1) DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
NONE	N/A

(1) The No Action alternative for Area 11 soils is a true "no-action" - no additional measures, which incur cost, will be taken for this alternative

# TABLE 7-14 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

## SOURCE AREA 11 ALTERNATIVE SCS-11B: LIMITED ACTION - DEED RESTRICTIONS COST SUMMARY

Item/Description	Total Cost
CAPITAL COSTS	
Deed Restrictions (land use)	\$25,000
SUBTOTAL CONSTRUCTION COS	\$25,000 \$25,000
Bid and Scope Contingency (10%)	\$2,500
TOTAL CAPITAL C	OSTS \$28,000
ANNUAL OPERATING AND MAINTENANCE COSTS	
None	
TOTAL ANNUAL C	OSTS \$0
REPLACEMENT COSTS	
None	
TOTAL REPLACEMENT COS	STS <sup>(2)</sup> \$0
PRESENT WORTH ANALYSIS	
Total Capital Costs (from above) (3)	\$28,000
Present Worth Annual O&M Costs (4)	\$0
Present Worth Replacement Costs	\$0
TOTAL PRESENT W	ORTH \$28,000

- (1) Capital costs for construction items do not include oversight fees, which are accounted for separately.
- (2) Replacement costs include construction and oversight capital costs.
- (3) Capital costs represent the present worth of the given alternative.
- (4) Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years.

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 11 ALTERNATIVE SCS-11B: LIMITED ACTION - DEED RESTRICTIONS DETAILED COST ESTIMATE

ľ						Construction		Start-up &
I						Installation	Annual O&M	Baseline
I	COST COMPONENT	Unit	No. Units	<b>Unit Cost</b>	Capital Cost	Costs	Costs	Costs
þ	57 54 KO 566 (CAR CAR CAR CAR	Assessed to a		) ·	\$25,000		ka sia serana arente	
ľ	legal fees				\$25,000			

## SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 11 ALTERNATIVE SCS-11B: LIMITED ACTION - DEED RESTRICTIONS DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT		COMMENTS	
ार्ड्स स्टब्स्स्ट्रास्ट्रास्ट्रास्ट्रास्ट्रास्ट्रास्ट्रास्ट्रास्ट्रास्ट्रास्ट्रास्ट्रास्ट्रास्ट्रास्ट्रास्ट्रा	and the second second	Andreas de la companya del companya del companya de la companya de	
	legal fees Based on CDM experience		

# TABLE 7-15 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

## SOURCE AREA 11 ALTERNATIVE SCS-11C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION COST SUMMARY

	Item/Description	Total Cost
CAPITAL COST	s	
	General	\$3,000
	Soil Vapor Extraction (with emission controls)	\$242,000
	Catalytic Oxidation System	\$143,500
	SUBTOTAL CONSTRUCTION COSTS (1)	\$388,500
	Bid Contingency (10%)	\$39,000
	Scope Contingency (10%)	\$39,000
	Engineering and Design (15%)	\$58,000
	Oversight/Health and Safety (5%)	\$19,000
	TOTAL CAPITAL COSTS	\$543,500
	General	\$18,000
	Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance	•
	Catalytic Oxidation System Maintenance Post Treatment Sampling	\$36,000 \$68,880 \$90,000
DEDLA OFMENT	Catalytic Oxidation System Maintenance Post Treatment Sampling TOTAL ANNUAL COSTS	\$68,880 \$90,000
REPLACEMENT	Catalytic Oxidation System Maintenance Post Treatment Sampling TOTAL ANNUAL COSTS	\$68,880 \$90,000
REPLACEMENT	Catalytic Oxidation System Maintenance Post Treatment Sampling TOTAL ANNUAL COSTS	\$68,886 \$90,000 \$212,886
	Catalytic Oxidation System Maintenance Post Treatment Sampling  TOTAL ANNUAL COSTS  COSTS  TOTAL REPLACEMENT COSTS (2)	\$68,880 \$90,000 \$212,880
	Catalytic Oxidation System Maintenance Post Treatment Sampling  TOTAL ANNUAL COSTS  COSTS  TOTAL REPLACEMENT COSTS (2)	\$68,880
	Catalytic Oxidation System Maintenance Post Treatment Sampling  TOTAL ANNUAL COSTS  COSTS  TOTAL REPLACEMENT COSTS (2)	\$68,880 \$90,000 \$212,880 \$0
REPLACEMENT	Catalytic Oxidation System Maintenance Post Treatment Sampling  TOTAL ANNUAL COSTS  COSTS  TOTAL REPLACEMENT COSTS (2)  TH ANALYSIS  Total Capital Costs (from above) (3)	\$68,880 \$90,000 \$212,880

- (1) Capital costs for construction items do not include oversight fees, which are accounted for separately.
- (2) Replacement costs include construction and oversight capital costs.
- (3) Capital costs represent the present worth of the given alternative.
- (4) Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years.

Note: SVE present worth costs are based on 30 year operation.

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 11 ALTERNATIVE SCS-11C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION DETAILED COST ESTIMATE

					Construction/		Start-up 8
					Installation	Annual O&M	Baseline
COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Costs	Costs	Costs
ALLEN .	مياته وماليا والأ	فيخفوننا للاسرمها	A 122	\$3,000		310,300	\$0
construction trailer (rental and delivery)	yr	1	\$3,300			\$3,300	
mobilization	is	1	\$1,000	\$1,000			
demobilization	15	1	\$1,000	\$1,000			
decon facilities	ea	1	\$1,000	\$1,000			
health and safety equipment	yr	1	\$9,000			\$9,000	
electrical power service supply	yr	1	\$3,600			\$3,600	
water supply	yr	1	\$2,400			\$2,400	
が作れ込むを表された。 は、 は、 は、 は、 は、 は、 は、 は、 は、 は、	:	:		\$203,695	JA25	(38,000)	· <u></u>
SVE well installation	ea	5	\$6,000		\$30,000		
SVE main system	unit	1	\$18,000	\$18,000	\$6,000	\$10,000	
SVE control panels	unit	1	\$3,000	\$3,000	\$1,500	\$500	
6" carbon steel piping	ft	535	<b>\$</b> 57	\$30,495			
4" carbon steel piping [	ft	100	\$32	\$3,200			
excevation for piping placement	ft	635	\$0.67		\$425		
electrical power requirements (25 HP)	ls	1	\$25,000			\$25,000	
SVE treatment building	sf	800	\$180	\$144,000	included		
air/water separator tank	Is	1	\$5,000	\$5,000		\$500	
राष्ट्रकृतिहरूके के कार्याय कर्युक्त व				8143,500	<b>30</b> .	333,521	30
Catalytic Oxidation Unit	ls	1	\$143,500	\$143,500	included	\$10,000	
Natural Gas	is	1	\$12,000			\$12,000	
Catalyst Replacement	ea	9	\$9,600			\$2,880	
Sampling	68	8	\$5,500			\$44,000	
nakanaan enameri						320500	. 30.
Test Kits/ Field Screening (per year)	samples	33	\$300			\$9,900	
Laboratory Analysis (VOCs, N, P) (per year)	samples	390	\$200			\$78,000	
shipping and handling (per year)	shipmt	24	\$100			\$2,400	

<sup>(1)</sup> All Post Treatment Sampling costs are presented in costs per number of samples and shipments required per year - costs are presented as annual O&M costs

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 11 ALTERNATIVE SCS-11C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
General	
construction trailer (rental and delivery)	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
mobilization	Heavy equipment and trailers, per vendor estimate
demobilization	Allowance for trailer and equipment demobilization
decon facilities	Based on level of personal and vehicle decontamination anticipated for this alternative
health and safety equipment	Allowance based on CDM equipment rates
electrical power service supply	Based on expected electrical costs per month for this alternative
water supply	Based on expected use per month for this alternative (e.g., decon, personnel use)
RISTRATORY STATEMENT REVIEW	
SVE well installation	Cost associated with installation of SVE wells. Based on CDM experience.
	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator.
SVE main system	condensate transfer pump, high condens, level alarm, vac. relief valve, vac. gauges, skid mitting.
[	interconnecting piping and a manual motor start switch
SVE control panels	Vendor estimate - NEEP (May 1998)
6° carbon steel piping	based on CDM experience
4" carbon steel piping	based on CDM experience
excavation for piping placement	12" wide trench and backfill, 36" deep as per 1996 Means
electrical power requirements (40 HP)	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
SVE treatment building	Basic prefabricated building on concrete pad. Based on CDM experience.
air/water separator tank	Based on CDM experience
catalytic oxidizer/thermal treatment	Based on vendor estimates
10 11 10 1 10 10 10 10 10 10 10 10 10 10	The second secon
Catalytic Oxidation Unit	Vendor estimate - Global Technologies, Inc. (May 2000)
Natural Gas	Vendor estimate - Global Technologies, Inc. (May 2000)
Catalyst Replacement	Vendor estimate - Global Technologies, Inc. (May 2000)
	Based on CDM experience
20 ye h Figil diest birdlides	
	Based on CDM experience and average test kit costs - ~25 samples per test kit; samples
Test Kits/ Field Screening (per year)	collected on a grid of 1 sample/250 cy contam. mat1, 1 sampling grid per 2 weeks
	Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of 1
	sample/250cy contam. material; 1 sampling grid per month (including QA/QC samples)
shipping and handling (per year)	Costs associated with transporting samples from site to laboratory twice per month

#### **TABLE 7-16**

## SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FOCUSED FEASIBILITY STUDY

# SOURCE AREA 4 - LEACHATE ALTERNATIVE SCL-4A: NO ACTION / LEACHATE MONITORING/ RESTRICTIONS ON GROUNDWATER USAGE/ NATURAL ATTENUATION COST SUMMARY

Item/Description	Total Cost
CAPITAL COSTS	
Groundwater Use Restrictions	\$25,000
Leachate Monitoring Wells	\$18,000
SUBTOTAL CONSTRUCTION COSTS	\$43,000
Bid and Scope Contingency (20%)	\$9,000
Oversight/Health and Safety (5%)	\$2,000
TOTAL CAPITAL COSTS (1)	\$54,000
ANNUAL OPERATING AND MAINTENANCE COSTS	
Leachate Sampling and Analysis (per event)	\$7,000
TOTAL ANNUAL COSTS	\$7,000
REPLACEMENT COSTS (2)	
Monitoring Well Replacement (every 15 years)	\$29,000
TOTAL REPLACEMENT COSTS	\$29,000
PRESENT WORTH ANALYSIS	
Total Capital Costs (from above) (3)	\$54,000
Present Worth Annual O&M Costs (4)  Leachate Sampling	
Quarterly Sampling - years 1 and 2	\$52,000
Semi-annual Sampling - years 3 through 30	\$149,000
Present Worth Replacement Costs (5)	\$14,000
TOTAL PRESENT WORTH	\$269,000

- (1) Capital costs for construction items do not include oversight fees.
- (2) Replacement costs include construction and oversight capital costs.
- (3) Capital costs represent the present worth of the given alternative.
- (4) The "Present Worth Annual O&M Cost" line item includes all annual costs except for costs per sampling and analysis event. Costs incurred for sampling and analysis are broken down per sampling schedule as listed. Sampling and analysis costs are based on a 7% discount rate over a 30 year projection (Based on RCRA Closure Guidelines).
- (5) Present worth of replacement costs is based on a 7% annual discount rate and replacement of monitoring wells replacement every 15 years.

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT SOURCE AREA 4 - LEACHATE

### ALTERNATIVE SCL-4A: NO ACTION / LEACHATE MONITORING/ RESTRICTIONS ON GROUNDWATER USAGE/ NATURAL ATTENUATION DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
							:
Lagal Food	la .	1	\$25,000	\$25,000			
well installation and materials	well	4	\$4,500		\$18,000		
to the second of						****	
labor	hours	40	\$60			\$2,400	
vehicle	day	2	\$60			\$120	557.14-50
equipment	ls.	1	\$600			\$600	
miscelleneous	la,	1	\$1,000			\$500	
leachele leboratory analysis	each	8	\$380			\$3,040	

<sup>(1)</sup> The monitoring schedule over 30 years was assumed as:

Years 1,2 = quarterly sampling: Years 3 through 30= semi-annual sampling (Based on RCRA Closure Guidelines)

These costs are incorporated in each alternative's cost summery under "Annual Operation and Maintenance."

#### SOURCE AREA 4 - LEACHATE

ALTERNATIVE SCL-4A: NO ACTION / LEACHATE MONITORING/ RESTRICTIONS ON GROUNDWATER USAGE/ NATURAL ATTENUATION DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
Geography Mark Restriction	gradiente de la companya de la comp
legal feet	Cost based on CDM experience
A CONTRACTOR OF THE STATE OF TH	
well installation and materials	Cost based on CDM experience in monitoring well installation
<b>म्याप्ट्रिक्ट वर्षे व्याध्यक्ति ५० ५ ० ५० ५ ० ५</b>	
English appear allower in	
labor	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
vehicle	Based on \$60/day rental fee for a field vehicle
equipment	Based on CDM equipment rental rates
miscellaneous	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
}	Based on average cost incurred for VOCs and bioparameters. One duplicate and one blank will be
Neachate (aboratory analysis	collected per 10 samples

#### **TABLE 7-17**

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT FOCUSED FEASIBILITY STUDY ROCKFORD, ILLINOIS

#### **AREA 4 - LEACHATE**

ALTERNATIVE SCL-4B: LIMITED ACTION / LEACHATE MONITORING / LEACHATE COLLECTION AND TREATMENT BY AIR STRIPPING UNIT / OFF-SITE SURFACE WATER DISCHARGE / GROUNDWATER USE RESTRICTIONS COST SUMMARY

	Item/Description	Total Cost
CAPITAL C	OSTS	•
	Groundwater Use Restrictions	<b>\$</b> 25,000
	Leachate Containment System	\$118,000
	Leachate Monitoring Wells	\$18,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$161,000
	Bid Contingency (15%)	\$24,000
	Scope Contingency (20%)	<b>\$</b> 32,000
	Engineering and Design (15%)	\$24,000
	Oversight/Health and Safety (5%)	\$8,000
	TOTAL CAPITAL COSTS	\$249,000
ANNUAL OF	PERATING AND MAINTENANCE COSTS	
	Leachate Containment System	\$7,000
	Leachate Containment System Sampling and	
	Analysis (per event)	\$4,000
	Leachate Sampling and Analysis (per event)	\$5,000
	TOTAL ANNUAL COSTS	\$16,000
REPLACEM	ENT COSTS (2)	
	Leachate Containment System (every 15 years)	\$78,000
	Monitoring Well Replacement (every 15 years)	\$29,000
	TOTAL REPLACEMENT COSTS	\$107,000
PRESENT V	VORTH ANALYSIS	
	Total Capital Costs (from above) (3)	\$249,000
	Present Worth Annual O&M Costs (4)	\$87,000
	Leachate Containment System	72.,300
	Quarterly Sampling - years 1 through 30	\$200,000
	Leachate Monitoring Wells	
	Quarterly Sampling - years 1 and 2	\$37,000
	Semi-annual Sampling - years 3 through 30	\$106,000
	Present Worth Replacement Costs (5)	\$53,000

<sup>(1)</sup> Capital costs for construction items do not include oversight fees.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> The "Present Worth Annual O&M Cost" line item includes all annual costs except for costs per sampling and analysis event. Costs Incurred for sampling and analysis are broken down per sampling schedule as listed. Sampling and analysis costs are based on a 7% discount rate over a 30 year projection (Based on RCRA Closure Guidelines).

<sup>(5)</sup> Present worth of replacement costs is based on a 7% annual discount rate and replacement of monitoring wells replacement and leachate collection system (including extraction wells, piping, pumps, and air stopping unit) every 15 years.

#### AREA 4 - LEACHATE

ALTERNATIVE SCL-4B: LIMITED ACTION / LEACHATE MONITORING / LEACHATE COLLECTION AND TREATMENT BY AIR STRIPPING UNIT / OFF-SITE SURFACE WATER DISCHARGE / GROUNDWATER USE RESTRICTIONS

DETAILED COST ESTIMATE

					Construction/ Installation	Annual O&M	Start-up & Baseline
COST COMPONENT	Unit			Capital Cost	Costs	Costs	Costs
PRIORIO MENERAL PRESENCIO DE		*		\$25,000			
Legal Fees	is	1	\$25,000	\$25,000	-775 - 7 ·		
हार्यक्षणाः अन्यकाराकारामकः अञ्चलका		+	متنتسا	320,770	\$26,800	\$7,000	<b>60</b>
mobilization/demobilization	ls_	1	\$9,000	\$9,000			
treatment building	ft <sup>2</sup>	400	\$100	\$40,000			
electrical supply	ls	1	\$5,000	\$5,000			
extraction well installation	well	4	\$5,800		\$23,200		
pump materials and installation	pump	6	\$1,180	\$7,080	\$600	\$2,000	
4" die cerbon steel header pipe	feet	20	\$32	\$640			
6" dia : carbon steel header to air stripper pipe	feet	150	<b>\$</b> 57	\$8,550			
air stripping treatment unit installation and materials	ls	1	\$15,500	\$15,500	\$3,000	\$5,000	
6" carbon steel air stripping unit discharge pipe	feet	200	\$25	\$5,000			
<ul> <li>Fire the street of the street o</li></ul>				Œ	13,000		\$0
well installation and materials	well	4	\$4,500		\$18,000		
ed delició focular establicado en discolar en delición de la composición del composición de la composición de la composición de la composición del composición de la composición del composición de la composición de la composición de la composición de la composición del composi				30	39	53760	:3 <sup>1</sup> 4
labor	hours	10	<b>\$</b> 60			\$600	
vehicle	day	1	<b>\$</b> 60			\$60	
equipment	ls	1	\$600			\$600	
miscellaneous	is	1	\$1,000			\$500	
leachate treatment system laboratory analysis	each	2	\$1,000			\$2,000	
वादश्वायकः स्वरूपः अस्य सामायः अस्य विकास्योगस्य । अस्य भरतम् । विकासम्बद्धां स्वरूपः ।				. 10	:10	34,660	30
labor	hours	40	\$60			\$2,400	
vehicle	day	2	\$60			\$120	
equipment	Is	1	\$600			\$600	
miscellaneous	ls	1	\$1,000			<b>\$</b> 500	
leachate laboratory analysis	each	8	\$130			\$1,040	

#### tojet, otota ifatischigtabistabisameterametelezitere,

Years 1,2 = quarterly sampling: Years 3 through 30= semi-ennual sampling (Based on RCRA Closure Guidelines)

These costs are incorporated in each alternative's cost summary under "Annual Operation and Maintenance."

 $<sup>^{\</sup>left( t\right) }$  The monitoring schedule over 30 years was assumed as

#### AREA 4 - LEACHATE

ALTERNATIVE SCL-4B: LIMITED ACTION / LEACHATE MONITORING / LEACHATE COLLECTION AND TREATMENT BY AIR STRIPPING UNIT / OFFSITE SURFACE WATER DISCHARGE / GROUNDWATER USE RESTRICTIONS
DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
Child Little winds to be	
legal fees	Cost based on CDM experience
अन्य के तर्म स्वयं कृति विकास के अपने कारण	the state of the s
	Cost based on CDM experience
	Based on a 20 foot x 20 foot building - cost based on Means Building Construction Cost Data
•	Based on CDM experience
,	4" diameter, stainless steel construction, 35 foot depth with 10 foot screen - cost based on CDM
extraction well installation	experience of average extraction well installation costs.
	1 pump per well (2 spare) @ 1.2 to 7 gpm flow with/control box each pump - costs based on April 1998
pump installation	Grundfos cost estimate
	4" diameter carbon steel pipe, 10 foot linkages from each of the 4 wells to treatment unit (with 15%
4" dia well connected to main pipe	contingency) - cost based on CDM experience
	4" diameter carbon steel pipe, header pipe (with 15% contingency) for connection between each well and
6" dia. pipe connected to air stripping unit	leachate treatment unit - cost based on CDM experience
	Shallow Tray air stripper model 1321 with options - cost based on April 1998 North East Environmental
air stripping treatment unit	Products, Inc. cost estimate
	6" diameter carbon steel pipe, 10 foot linkages from treatment unit to off-site surface water discharge (with
leachate discharge pipe	15% contingency) - cost based on CDM experience
N. E. John Co. M. G. Mark and Apply Ch. 15	and the second s
	Cost based on CDM experience in monitoring well installation
A CHANGE OF THE CONTROL OF THE CONTROL OF THE	
<b>为此的形成是1900年的</b>	<u>a la companya di mangantan di </u>
	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
	Based on \$60/day rental fee for a field vehicle
	Based on CDM equipment rental rates
miscellaneous	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
	Based on average cost incurred for priority pollutants analysis; One duplicate and one blank will be
leachate treatment system laboratory analysis	collected per 10 samples.
ক্ষা প্রেক্তির সংগ্রেক্ত করি ক্ষা করিছে। ক্ষার্যক্ষা করি পরিক্রা করি ক্ষা করিছে।	·
lebor	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
vehicle	Based on \$60/day rental fee for a field vehicle
equipment	Based on CDM equipment rental rates
miscellaneous	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
leachate laboratory analysis	Based on average cost incurred for VOCs; One duplicate and one blank will be collected per 10 samples

# TABLE 7-18 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FOCUSED FEASIBILITY STUDY

# AREA 4 - LEACHATE ALTERNATIVE SCL-4C: AIR SPARGING ALONG GMZ BOUNDARY/ LEACHATE MONITORING / GROUNDWATER USE RESTRICTIONS COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	Groundwater Use Restrictions	\$25,00
	General	\$1,038,00
	VRS	\$180,00
	Air Sparging	\$62,00
	Leachate Monitoring Wells	\$9,00
	SUBTOTAL CONSTRUCTION COSTS (1)	\$1,314,00
	Bid Contingency (10%)	\$197,00
	Scope Contingency (20%)	\$263,00
	Engineering and Design (15%)	\$197,00
	Oversight/Health and Safety (5%)	\$66,00
	TOTAL CAPITAL COSTS	\$2,037,00
ANNUAL OPERATI	NG AND MAINTENANCE COSTS	
	VRS Maintenance/Electrical	\$26,00
	Leachate Sampling and Analysis (per sample event)	\$5,00
	Air Sparging System Maintenance/Electrical	\$26,00
	Air Sparging System Maintenance/Electrical	420,00
	TOTAL ANNUAL COSTS	
REPLACEMENT CO	TOTAL ANNUAL COSTS	
REPLACEMENT CO	TOTAL ANNUAL COSTS	\$57,000
REPLACEMENT CO	TOTAL ANNUAL COSTS  DSTS  Leachate Monitoring Wells (every 15 years)  Equipment Replacement (e.g., motors, blowers) -	\$57,00 \$29,00
REPLACEMENT CO	TOTAL ANNUAL COSTS  DSTS  Leachate Monitoring Wells (every 15 years)	\$57,000 \$57,000 \$29,000 \$10,000
REPLACEMENT CO	TOTAL ANNUAL COSTS  DSTS  Leachate Monitoring Wells (every 15 years)  Equipment Replacement (e.g., motors, blowers) -	\$57,000 \$29,000 \$10,000
	TOTAL ANNUAL COSTS  DSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$57,000 \$29,000
	TOTAL ANNUAL COSTS  DSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$57,000 \$29,000 \$10,000
	TOTAL ANNUAL COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  ANALYSIS  Total Capital Costs (from above) (3)	\$57,000 \$29,000 \$10,000 \$39,000
	TOTAL ANNUAL COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$57,000 \$29,000 \$10,000 \$39,000 \$2,037,000
	Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4) Quarterly Sampling - years 1 and 2	\$57,00 \$29,00 \$10,00 \$39,00 \$2,037,00 \$323,00
REPLACEMENT CO	TOTAL ANNUAL COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4)	\$29,00 \$10,00 \$39,00 \$2,037,00 \$323,00 \$37,00

- (1) Capital costs for construction items do not include oversight fees, which are accounted for separately.
- (2) Replacement costs include construction and oversight capital costs.
- (3) Capital costs represent the present worth of the given alternative.
- (4) The "Present Worth Annual O&M Cost" line item includes all annual costs except for costs per sampling and analysis event. Costs incurred for sampling and analysis are broken down per sampling schedule as listed. Sampling and analysis costs are based on a 7% discount rate over a 30 year projection (Based on RCRA Closure Guidelines).
- (5) Present worth of replacement costs is based on a 7% annual discount rate and replacement of system equipment and monitoring wells every 15 years (twice over 30 year projection).

#### AREA 4 - LEACHATE

ALTERNATIVE SCL-4C: AIR SPARGING ALONG GMZ BOUNDARY/ LEACHATE MONITORING / GROUNDWATER USE RESTRICTIONS DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M Coets	Start-up & Baseline Costs
ESTEROLOGICA CONTRACTOR CONTRACTOR				.20.00	14	10	.31
Legal Fees	ls	1	\$25,000	\$25,000			
( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )							
construction trailer (rental and delivery)	mo	360	\$275	\$99,000			
mobilization	ls	1	\$1,000	\$1,000			
demobilization	ls.	1	\$1,000	\$1,000			
decon facilities	68	1	\$1,000	\$1,000			
health and safety equipment	mo	360	\$2,000	\$720,000			
electrical power service supply	mo	360	\$400	\$144,000			
water supply	mo	360	\$200	\$72,000			
K 19 V V					4.		3.
well installation and materials	well	2	\$4,500		\$9,000		
		,		1, 1, 1			
VRS well installation	<b>00.</b>	3	\$6,000		\$18,000		
VRS main system	<u>ls</u>	1	\$14,000	\$14,000	\$5,000	\$10,000	
VRS control panels	<u>ls</u>	11	\$3,000	\$3,000	\$1,000	\$500	
6° cerbon steel piping	ı	120	\$57	\$6,840			
4" cerbon steel piping	ft	225	\$32	\$7,200			
excevation for piping placement	ft	345	\$0.67		\$231		
electrical power requirements (10 HP)	yr.	1	\$10,000			\$10,000	
VRS treatment building	sf	400	\$100	\$40,000	included		
air/water seperator tank	ls	1	\$5,000	\$5,000		\$1,000	
catalytic oxidation of amission	is	1	\$80,000	\$80,000	included	\$4,000	
Contract Con				- <del>*3</del> , *		Y Lay Edi	<u> </u>
AS well installation	- 04	6	\$6,000		\$36,000		
AS main system	is	1		\$4,000	\$1,000	\$1,000	
AS control panels	ls	11		\$3,000	\$1,000	\$500	
6° certon steel piping	ft	120	\$57	\$6,840			
4" carbon ateel piping	R	310	\$32	\$9,920			<u>.</u>
excevelion for piping placement	ft	430	\$0.67		\$288		
electrical power requirements (15 HP)	year	1	\$15,000			\$15,000	
				ded with corres			
				duded with com			
				ded with corresp			
air collection and breament	cost for co	lection and t	restment inc	luded with come	eponding VRS		
e. No sign is the control of the con						144	
Aubor	hours	40	\$60			\$2,400	
vehicle	day	2	\$60			\$120	
Inemqiupe	ls	1	\$600			\$600	
miscellaneous	ls	1	\$1,000			\$500	
leachate laboratory analysis	each	8	\$130			\$1,040	

### AREA 4 - LEACHATE

ALTERNATIVE SCL-4C: AIR SPARGING ALONG GMZ BOUNDARY/ LEACHATE MONITORING / GROUNDWATER USE RESTRICTIONS DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
Grounding of Health editions	
legal fees	Cost based on CDM experience
Sind i	
construction trailer (rental and delivery)	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
mobilization	Heavy equipment and trailers, per vendor estimate
demobilization	Allowance for trailer and equipment demobilization
decon facilities	Based on level of personal and vehicle decontamination anticipated for this alternative
health and safety equipment	Allowance based on CDM equipment rates
electrical power service supply	Based on expected electrical costs per month for this alternative
water supply	Based on expected use per month for this alternative (e.g., decon, personnel use)
म् राजीरपुर । स्तितिस्तितास्त्रीरागः ।	· · · · · · · · · · · · · · · · · · ·
well installation and materials	Cost based on CDM experience in monitoring well installation
A transity beta length is primited	
VRS well installation	Cost associated with installation of SVE wells. Based on CDM experience.
	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator,
	condensate transfer pump, high condens, level alarm, vac. relief valve, vac. gauges, skid mnting,
VRS main system.	interconnecting piping and a manual motor start switch
VRS control panels	Vendor estimate - NEEP (May 1998)
6" carbon steel pipe	based on CDM experience
4" carbon steel pipe	based on CDM experience
excavation for piping placement (5 foot depth)	12" wide trench and backfill, 36" deep as per 1996 Means
electrical power requirements (10 HP)	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
VRS treatment building	Basic prefabricated building on concrete pad. Based on CDM experience
air/water separator tank	Based on CDM experience
catalytic oxidizer/thermal treatment	Based on CDM experience
अभवत्यक्तिकार्यः ।	
AS well installation	Cost associated with installation of AS wells. Based on CDM experience.
AS main system	Vendor: includes blower, exp motor, inline silencer, pressure relief valve, unitized base, pressure
no man ayalom	gauge and a manual motor starting switch.
AS control panels	Vendor estimate
6" carbon steel piping	Based on CDM experience
	Based on CDM experience
	12" wide trench and backfill, 36" deep as per 1996 Means
	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
AS treatment building	Costs for AS treatment building included with corresponding VRS
air/water separator tank	Costs for air/water separator tank included with corresponding VRS
	Costs for thermal air treatment included with corresponding VRS
air collection and treatment	Cost for collection and treatment of air included with corresponding VRS
្រាស្ត្រាប់ជាតិបាន១០ការប្រកាសិតសេ! «១០ខេញ» ទីសេវាមារៈ	
	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
	Based on \$60/day rental fee for a field vehicle
· · · · · · · · · · · · · · · · · · ·	Based on CDM equipment rental rates
miscellaneous	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
	Based on average cost incurred for volatile organic compound analysis. One duplicate and one
facabata fabaratan arabata	blank will be collected per 10 samples.

#### **TABLE 7-19**

## SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT FOCUSED FEASIBILITY STUDY ROCKFORD, ILLINOIS

### AREA 4 - LEACHATE

### ALTERNATIVE SCL-4D: REACTIVE BARRIER WALL / LEACHATE MONITORING / GROUNDWATER USE RESTRICTIONS COST SUMMARY

Į:	tem/Description	Total Cost
CAPITAL COSTS	3	
C	Groundwater Use Restrictions	\$25,000
F	Reactive Barrier Wall	\$3,580,000
L	eachate Monitoring Wells	\$45,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$3,650,000
8	Bid Contingency (15%)	\$548,000
S	Scope Contingency (20%)	\$730,000
E	Ingineering and Design (15%)	\$548,000
C	Oversight/Health and Safety (5%)	\$183,000
	TOTAL CAPITAL COSTS	\$5,659,000
ANNUAL OPERA	TING AND MAINTENANCE COSTS	
Ĺ	eachate Sampling and Analysis (per event)	\$7,000
	TOTAL ANNUAL COSTS	\$7,000
REPLACEMENT	COSTS (2)	-
lr	on Rejuvenation	\$25,000
	flonitoring Well Replacement (every 15 years)	\$58,000
	TOTAL REPLACEMENT COSTS	\$83,000
PRESENT WORT	'H ANALYSIS	<del> </del>
Т	otal Capital Costs (from above) (3)	\$5,659,000
	Present Worth Annual O&M Costs (2)	
·	Quarterly Sampling - years 1 and 2	\$52,000
	Semi-annual Sampling - years 3 through 30	\$149,000
P	resent Worth Replacement Costs (3)	\$51,000

- (1) Replacement costs include construction and oversight capital costs.
- (2) Capital costs represent the present worth of the given alternative.
- (4) The "Present Worth Annual O&M Cost" line item includes all annual costs except for costs per sampling and analysis event. Costs incurred for sampling and analysis are broken down per sampling schedule as listed. Sampling and analysis costs are based on a 7% discount rate over a 30 year projection (Based on RCRA Closure Guidelines).
- (3) Present worth of replacement costs is based on a 7% annual discount rate and replacement of monitoring wells every 15 years and Iron rejuvenation every 10 years (three times over 30 year projection).

#### AREA 4 - LEACHATE

### ALTERNATIVE SCL-4D: REACTIVE BARRIER WALL / LEACHATE MONITORING / GROUNDWATER USE RESTRICTIONS DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ installation Costs	Annual O&M Costs	Start-up & Baseline Costs
जिल्लाहरूतियास्य स्थानितास्य ।				\$25,000			
iegal fees	is	1	\$25,000	\$25,000			
get galeri karriarria Vera.		i		\$840,000	5276,0000	. 30	\$0
gate installation	ħ²	18,000	\$150		\$2,700,000		
iron	ft3	21,000	\$40	\$840,000			
jetting well meterials and installation	well	2	\$20,000		\$40,000		
Entre Control Control (Control Control					التدائلة	. 50	1.
well installation and materials	well	10	\$4,500		\$45,000		
ENDER Challand base mater and				į .		1 - 25	
वार्वित्र के किए के बाता किया प्राप्त के विद्यार्थ हैं।				30	90	\$6700	30
lebor	hours	60	\$60			\$3,600	
vehicle	day	3	\$60			\$180	
equipment	ls	1	\$600			\$600	
miscellaneous	ls	1	\$1,000			\$500	
leachate laboratory analysis	each	14	\$130			\$1,820	

### विभागानिक भारतीयो इत्यालेबीयका देवने हैं जीती विभागी हुए हैं।

 $<sup>^{(1)}</sup>$  The monitoring schedule over 30 years was assumed as

Years 1,2 = quarterly sampling. Years 3 through 30= semi-annual sampling (Based on RCRA Closure Guidelines)

These costs are incorporated in each alternative's cost summary under "Annual Operation and Maintenance"

### AREA 4 - LEACHATE ALTERNATIVE SCL-4D: REACTIVE BARRIER WALL / LEACHATE MONITORING / GROUNDWATER USE RESTRICTIONS DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
अधिकार विकास स्थापन	
logal foot	Cost based on CDM experience
101:17 (E 90 + 14)	Service of the Control of the Contro
gate matallation	Cost based on CDM expenence
lron	Cost based on CDM experience
jetting well materials and installation	Cost based on CDM experience
E SER SE MENSIONE IN	
well installation and materials	Cost based on CDM expenence in monitoring well installation
· · ·	
Protegrant with the control of the control of	
labor	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
vehicle	Based on \$300/week rantal fee for a field vehicle
equipment	Based on CDM equipment rental rates
	incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
leachate laboratory analysis	Based on average cost incurred for VOCs, One duplicate and one blank will be collected per 10 samples

### TABLE 7-20

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FOCUSED FEASIBILITY STUDY

#### AREA 4 - LEACHATE

### ALTERNATIVE SCL-4E: AIR SPARGING ALONG GMZ BOUNDARY AND SOURCE AREA / LEACHATE MONITORING / GROUNDWATER USE RESTRICTIONS COST SUMMARY

	Item/Description	Total Cost
CAPITAL COST	rs .	
	Groundwater Use Restrictions	\$25,00
	General	\$1,038,000
	VRS	\$312,000
	Air Sparging	\$104,000
	Leachate Monitoring Wells	\$9,00
	SUBTOTAL CONSTRUCTION COSTS (1)	\$1,488,000
	Bid Contingency (15%)	\$223,000
	Scope Contingency (20%)	\$298,000
	Engineering and Design (15%)	\$223,000
	Oversight/Health and Safety (5%)	\$74,00
	TOTAL CAPITAL COSTS	\$2,306,000
ANNUAL OPER	ATING AND MAINTENANCE COSTS	
	Leachate Sampling and Analysis (per sample event)	\$5,00
	VRS Regular System Maintenance/Electrical	\$26,00
	Air Sparging Regular System Maintenance/Electrical	\$20,000
	Air Sparging Regular System Maintenance/Electrical TOTAL ANNUAL COSTS	
REPLACEMENT	TOTAL ANNUAL COSTS	
REPLACEMENT	TOTAL ANNUAL COSTS  T COSTS  Leachate Monitoring Wells (every 15 years)	\$57,000
REPLACEMEN	TOTAL ANNUAL COSTS	\$26,000 \$57,000 \$29,000 \$20,000
REPLACEMEN	TOTAL ANNUAL COSTS  T COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) -	\$57,000 \$29,000 \$20,000
	TOTAL ANNUAL COSTS  T COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years	\$57,000 \$29,000 \$20,000
	TOTAL ANNUAL COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (27)  RTH ANALYSIS  Total Capital Costs (from above) (5)	\$57,000 \$29,000
	TOTAL ANNUAL COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (27)	\$29,000 \$20,000 \$49,000
	TOTAL ANNUAL COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (27)  RTH ANALYSIS  Total Capital Costs (from above) (5)	\$29,000 \$20,000 \$49,000 \$2,306,000
	TOTAL ANNUAL COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (7)  RTH ANALYSIS  Total Capital Costs (from above) (2) Present Worth Annual O&M Costs (4)	\$29,000 \$20,000 \$49,000 \$2,306,000 \$323,000
	TOTAL ANNUAL COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (7)  RTH ANALYSIS  Total Capital Costs (from above) (2) Present Worth Annual O&M Costs (4) Quarterly Sampling - years 1 and 2	\$29,000 \$20,000 \$49,000 \$2,306,000 \$323,000 \$37,000

- (1) Capital costs for construction items do not include oversight fees, which are accounted for separately
- (2) Replacement costs include construction and oversight capital costs.
- (3) Capital costs represent the present worth of the given alternative.
- (4) The "Present Worth Annual O&M Cost" line item includes all annual costs except for costs per sampling and analysis event. Costs incurred for sampling and analysis are broken down per samplin schedule as listed. Sampling and analysis costs are based on a 7% discount rate over a 30 year projection (Based on RCRA Closure Guidelines).
- (5) Present worth of replacement costs is based on a 7% annual discount rate and replacement of system equipment every 15 years (once over 30 year projection) and monitoring wells every 30 year

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT AREA 4 - LEACHATE

### ALTERNATIVE SCL-4E: AIR SPARGING ALONG GMZ BOUNDARY AND SOURCE AREA / LEACHATE MONITORING / GROUNDWATER USE RESTRICTIONS

#### **DETAILED COST ESTIMATE - COMMENTS**

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ installation Costs	Annual O&M	Start-up & Baseline Costs
Charles and the State State of	0			23(2)			
lagal food	18	1	\$25,000	\$25,000			
( )				37 34 301	1	34	J
construction trailer (rental and delivery)	mo	360	\$275	\$99,000			^
mobilization		1	\$1,000	\$1,000			
demobilization	ls	1	\$1,000	\$1,000			
decon fecilities	00	1	\$1,000	\$1,000		<del></del>	
health and safety equipment	mo	360	\$2,000	\$720,000			
electrical power service Supply	mo	360	\$400	\$144,000			
water supply	mo	360	\$200	\$72,000			
					* *		
well installation and materials	well	2	\$4,500		\$9,000		
				* A.		21 (2)	
vepor recovery well installation	68.	6	\$6,000		\$36,000	1	
vepor recovery main system	ls	1	\$14,000	\$14,000	\$5,000	\$10,000	
SVE control penels	ls.	1	\$3,000	\$3,000	\$1,000	\$500	
6" cerbon steel piping	W	225	\$57	\$12,825			
4" certion steel piping	H	345	\$32	\$11,040			
excevation for piping placement	If	570	\$0.67		\$382		
electrical power requirements (10 HP)	yr.	1	\$10,000			\$10,000	
vapor recovery treetment building	sf	800	\$180	\$144,000	included		
air/water seperator tank		1	\$5,000	\$5,000		\$1,000	
catalytic oxidation of amission	ls.	1	\$80,000	\$80,000	included	\$4,000	
Visite age of ASS						\$45,70	
AS well installation	- 04	10	\$6,000		\$60,000		
AS main system	ls .	1	\$4,000	\$4,000	\$1,000	\$1,000	
AS control panels	<u>ls</u>	1	\$3,000	\$3,000	\$1,000	\$500	
6° cerbon ateel piping	lf .	370	\$57	\$21,090	<b></b>		
. 4" cerbon steel piping		410	\$32	\$13,120			
excevation for piping placement	H	780	\$0.67	-	\$523		
electrical power requirements (15 HP)		1 1	\$15,000			\$15,000	
AS treatment building				ded with VRS	L		
air/ireter seperator tank							
catelytic audizenthernel treatment	Coets for t	normal air tre	etment inclu	ded with corresp	conding VRS		
						; <u>.</u>	
labor	hours	40	\$60			\$2,400	
vehicle	day	2	\$60			\$120	
equipment	16		\$600			\$800	
miscellaneous	10	1 1	\$1,000			\$500	
leachate laboratory analysis	each	] 8	\$130			\$1,040	

#### AREA 4 - LEACHATE

ALTERNATIVE SCL-4E: AIR SPARGING ALONG GMZ BOUNDARY AND SOURCE AREA / LEACHATE MONITORING / GROUNDWATER USE RESTRICTIONS

### DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
The second of th	
iegai fees	Cost based on CDM experience
ex 1/2 + 0	
	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
**	Heavy equipment and trailers, per vendor estimate
	Allowance for trailer and equipment demobilization
	Based on level of personal and vehicle decontamination anticipated for this alternative
health and safety equipment	Allowance based on CDM equipment rates
	Based on expected electrical costs per month for this alternative
water supply	Based on expected use per month for this alternative (e.g., decon, personnel use)
Notice and the state of the sta	• • • • • • • • • • • • • • • • • • • •
well installation and materials	Cost based on CDM experience in monitoring well installation
Charles State Control	
VRS well installation	Cost associated with installation of SVE wells. Based on CDM experience.
	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator, condensate
	transfer pump, high condens. level alarm, vac. relief valve, vac. gauges, skid mnting, interconnecting piping
VRS main system	and a manual motor start switch
VRS control panels	Vendor estimate - NEEP (May 1998)
6" carbon steel pipe	based on CDM experience
4° carbon steel pine	based on CDM experience
**	12" wide trench and backfill, 36" deep as per 1996 Means
	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
VRS treatment building	Basic prefabricated building on concrete pad. Based on CDM experience.
ain/water separator tank	Based on COM experience
catalytic oxidizenthermal treatment	Based on CDM experience
Wood Burrens	
AS well installation	Cost associated with installation of AS wells. Based on CDM experience.
40	Vendor: includes blower, exp motor, inline silencer, pressure relief valve, unitized base, pressure gauge and
AS main system	a manual motor starting switch.
AS control penels	Vendor estimate
6" cerbon steel piping	Based on CDM experience
,, ,	Based on CDM experience
	12" wide trench and backfill, 36" deep as per 1996 Means
	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
-	Costs for AS treatment building included with corresponding VRS
•	Costs for air/water separator tank included with corresponding VRS
cetalytic oxidizenthermal treatment	Costs for thermal air treatment included with VRS
Mark Charles and Charles and Mark Charles	
lebor	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
vehicle	Based on \$60/day rental fee for a field vehicle
equipment	Based on CDM equipment rental rates
miscellaneous	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
	Based on average cost incurred for volatile organic compound analysis; One duplicate and one blank will be
leachate laboratory analysis	collected per 10 samples.

#### **TABLE 7-21**

## SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FOCUSED FEASIBILITY STUDY

# SOURCE AREA 7 - LEACHATE ALTERNATIVE SCL-7A: NO ACTION / LEACHATE MONITORING/ GROUNDWATER USE RESTRICTIONS/ NATURAL ATTENUATION COST SUMMARY

	Item/Description	Total Cost
CAPITAL COS	тѕ	
	Groundwater Use Restrictions	\$25,000
	Leachate Monitoring Wells	\$23,000
	SUBTOTAL CONSTRUCTION COSTS	\$48,000
	Bid Contingency (15%)	\$7,000
	Scope Contingency (20%)	\$10,000
	Oversight/Health and Safety (5%)	\$2,000
	TOTAL CAPITAL COSTS	\$67,000
ANNUAL OPE	RATING AND MAINTENANCE COSTS	
	Leachate Sampling and Analysis (per event)	\$9,000
	TOTAL ANNUAL COSTS	\$9,000
REPLACEMEN	IT COSTS (1)	
	Monitoring Well Replacement (every 15 years)	\$44,000
	TOTAL REPLACEMENT COSTS	\$44,000
PRESENT WO	RTH ANALYSIS	
	Total Capital Costs (from above) (2) Present Worth Annual O&M Costs	\$67,000
	Quarterly Sampling - years 1 and 2	\$67,000
	Semi-annual Sampling - years 3 through 30	\$191,000
	Present Worth Replacement Costs (3)	\$22,000
	TOTAL PRESENT WORTH	\$347,000

<sup>(1)</sup> Replacement costs include construction and oversight capital costs.

<sup>(2)</sup> Capital costs represent the present worth of the given alternative.

<sup>(3)</sup> Present worth of replacement costs is based on a 7% annual discount rate and replacement of monitoring wells every 30 years.

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT SOURCE AREA 7 - LEACHATE

### ALTERNATIVE SCL-7A: NO ACTION / LEACHATE MONITORING/ GROUNDWATER USE RESTRICTIONS/ NATURAL ATTENUATION DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
English to the state of the sta				(25W)	. 1	. 45	
legel fees	ls	1	\$25,000	\$25,000			
					42.3.33		<u>.</u>
well installation and materials	well	5	\$4,500		\$22,500		
gen language in a management of a second control taken in							
						. <b></b>	. 25
lebor	hours	60	\$60			\$3,600	
vehicle	day	3	\$60			\$180	
nemqiupe	ls	1	\$600			\$600	
miscellaneous	is	1	\$1,000			\$500	
leachate laboratory analysis	each	11	\$380			\$4,180	

 $<sup>^{(0)}</sup>$  The monitoring schedule over 30 years was assumed as:

Years 1,2 = quarterly sampling: Years 3 through 30= semi-annual sampling (Based on RCRA Closure Guidelines)

These costs are incorporated in each alternative's cost summary under "Annual Operation and Maintenance."

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT SOURCE AREA 7 - LEACHATE

### ALTERNATIVE SCL-7A: NO ACTION / LEACHATE MONITORING/ GROUNDWATER USE RESTRICTIONS/ NATURAL ATTENUATION DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
Fig. 8.80 Fig. 18 Style 1	
legal free	Cost based on CDM experience
well installation and materials	Cost based on CDM experience in monitoring well installation
labor	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
vehicle	Based on \$60/day rental fee for a field vehicle
equipment	Based on CDM equipment rental rates
	incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
	Based on average cost incurred for VOCs and bioparameters; One duplicate and one blank will be
leachate laboratory enalysis	collected per 10 samples.

#### **TABLE 7-22**

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT FOCUSED FEASIBILITY STUDY ROCKFORD, ILLINOIS

#### AREA 7 - LEACHATE

ALTERNATIVE SCL-7B: MULTI-PHASE EXTRACTION/ COLLECT LEACHATE AND TREAT BY AIR STRIPPING UNIT / DISCHARGE TO ON-SITE SURFACE WATER / GROUNDWATER USE RESTRICTIONS/MONITORING COST SUMMARY

	Item/Description	Total Cost
CAPITAL (	COSTS	
	Groundwater Use Restrictions	\$25,000
	Leachate Containment System	\$322,000
	Leachate Monitoring Wells	\$23,000
	Multiphase Extraction in Source Areas	\$425,000
	Multiphase Extraction Monitoring	\$44,000
	Geophysical Survey	\$87,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$926,000
	Bid Contingency (15%)	\$139,000
	Scope Contingency (20%)	\$185,000
	Engineering and Design (15%)	\$139,000
	Oversight/Health and Safety (5%)	\$46,000
	TOTAL CAPITAL COSTS	\$1,435,000
	PERATING AND MAINTENANCE COSTS  Leachate Containment System	\$35,000
	Leachate Treatment System Sampling and Analysis (per sampling event)	\$4,000
	Leachate Sampling and Analysis (per sampling event)	\$6,000
	Multi-Phase Extraction in Source Areas	\$83,000
	TOTAL ANNUAL COSTS	\$128,000
REPLACEI	MENT COSTS <sup>(2)</sup>	
	Leachate Containment System (every 15 years)	\$282,000
	Monitoring Well Replacement (every 15 years)	\$44,000
	TOTAL REPLACEMENT COSTS	\$326,000
PRESENT	TOTAL REPLACEMENT COSTS  WORTH ANALYSIS	\$326,000 
PRESENT		
PRESENT	WORTH ANALYSIS	\$326,000 
PRESENT	WORTH ANALYSIS  Total Capital Costs (from above) (3)	\$1,435,000
PRESENT	WORTH ANALYSIS  Total Capital Costs (from above) (3)  Present Worth Annual O&M Costs (4)	\$1,435,000
PRESENT	WORTH ANALYSIS  Total Capital Costs (from above) (3)  Present Worth Annual O&M Costs (4)  Leachate Treatment System Sampling  Quarterly Sampling - years 1 through 30  Leachate Sampling	\$1,435,000 \$852,000 \$200,000
PRESENT	WORTH ANALYSIS  Total Capital Costs (from above) (3)  Present Worth Annual O&M Costs (4)  Leachate Treatment System Sampling  Quarterly Sampling - years 1 through 30  Leachate Sampling  Quarterly Sampling - years 1 and 2	\$1,435,000 \$852,000 \$200,000 \$44,000
PRESENT	WORTH ANALYSIS  Total Capital Costs (from above) (3)  Present Worth Annual O&M Costs (4)  Leachate Treatment System Sampling  Quarterly Sampling - years 1 through 30  Leachate Sampling  Quarterly Sampling - years 1 and 2  Semi-annual Sampling - years 3 through 30	\$1,435,000 \$852,000 \$200,000 \$44,000 \$145,000
PRESENT	WORTH ANALYSIS  Total Capital Costs (from above) (3)  Present Worth Annual O&M Costs (4)  Leachate Treatment System Sampling  Quarterly Sampling - years 1 through 30  Leachate Sampling  Quarterly Sampling - years 1 and 2	\$1,435,000 \$852,000 \$200,000 \$44,000

<sup>(1)</sup> Capital costs for construction Items do not include oversight fees.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> The "Present Worth Annual O&M Cost" line item includes all annual costs except for costs per sampling and analysis event. Costs incurred for sampling and analysis are broken down per sampling schedule as listed. Sampling and analysis costs are based on a 7% discount rate over a 30 year projection for the Leachate Containment System and over a 3 year projection for the Multi-Phase Extraction System (Based on RCRA Closure Guidelines).

<sup>(5)</sup> Present worth of replacement costs is based on a 7% annual discount rate and replacement of monitoring wells, and teachate containment system (including central pump station, extraction wells, piping, pumps, and air stripping unit) every 15 years (twice over 30 year projection).

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT AREA 7 - LEACHATE

#### ALTERNATIVE SCL-7B: MULTI-PHASE EXTRACTION/ COLLECT LEACHATE AND TREAT BY AIR STRIPPING UNIT / DISCHARGE TO ON-SITE SURFACE WATER / GROUNDWATER USE RESTRICTIONS/MONITORING DETAILED COST ESTIMATE

	. 12	<del>-</del>			Construction/ Installation	Annual O&M	Start-up & Baseline
COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Costs	Costs	Costs
On the state of the state of				22,500	\$F	<u>.</u> ½	
legal fees	ls	1	\$25,000	\$25,000			
part file of the angle of the control of the contro				22/2010	35 <b>33</b> 000	-2000	
mobilization/demobilization	Is	1	\$5,000	\$5,000			
treatment building	Is	1	\$40,000	\$40,000			······
electrical supply	ls.	1	\$5,000	\$5,000	640,000	<u> </u>	
extraction well materials and installation	well	10	\$6,000	<b>*20.000</b>	\$48,000	20.500	
pump materials and installation	pump	10	\$2,000	\$20,000	\$1,000	\$2,500	
2º die. cerbon steel cerbon steel pipe from well to header pipe	feet	160	\$25	\$4,000			
4" dia. carbon steel header pipe to Central Pump Station	feet	2,000	\$32	\$64,000			
Central Pump Station	ls	1	\$54,500	\$54,500		\$5,000	
4" dia. carbon steel pipe from Central Pump Station to air stripper							
unit	feet	300	\$32	\$9,600			
air stopping treatment unit and installation	unit	1	\$50,000	\$50,000	\$5,000	\$15,000	
Section that deal makes are to be seen	ls foot	500	\$12,000	848.000		\$12,000	
4" carbon steel discharge pipe to creek	feet	500	\$32	\$16,000	32. 16		
	well	5	\$4,500		\$22,500	11	
well installation and materials	West		\$4,500		\$22,500	_	
Brace and same de serve						2249	30
labor	hours	10	\$60		·	\$600	
vehicle	day	1	\$60			\$60	
equipment	Is	1	\$600	<del></del>		\$600	
miscellaneous	ls	1	\$1,000	<del></del>		\$500	
leachate treatment system laboratory analysis	each	2	\$1,000			\$2,000	
Contract and the contract of t						22/30	, <u>Ş</u> .
lebor	hour	60	\$60			\$3,600	
vehícle	day	3	\$60			\$180	
equipment	ls	1	\$600			\$600	
miscelleneous	ls	1	\$1,000			\$500	
leachate laboratory analysis	each	11	\$130			\$1,430	
March other in a same promote in a constraint in Sec. 1				3.其4500	<u>),</u>	· EMO ,	
Multi-Phase Wells (40 R., 4 inch PVC with development	each	10	\$6,000	\$60,000		<b></b>	
MPE System including enclosure	ls .	1 2000	\$200,000	\$200,000			
Piping (2 in. PVC @ 3 ft. bgs)	H H	2000	\$20	\$40,000			
Air Stripper System Expension	ls la	1	\$75,000	\$75,000			
Pliot Study	ls is	1	\$50,000	\$50,000		\$55,000	
OSM Materials and Labor  Supported Air Stripper O. S. M.	is Is	1	\$55,000 \$7,000			\$55,000 \$7,000	<del></del>
Expanded Air Stripper O & M  Expanded Air Stripper / Catalytic Oxidation	is is	1	\$7,000			\$7,000	
Expanded Air Supper / Catalytic Oxideson Natural Gas	ls	1	\$14,000			\$14,000	
Manager Descriptions of the control of	-9		4.4,000	* \$ 7 7 4	7.1	\$14,000	39
Multi-Phase Extraction Monitoring Walls	each	6	\$4,500	\$27,000			_
Continuous Recorders for Multi-Phase MWs	each	6	\$2,000	\$12,000			
Pressure Monitoring Points	each	9	\$500	\$4,500			
(							
Mob/Demob	İs	1	\$2,000	\$2,000			
Per Diem	ls	1	\$5,000	\$5,000			
Gamme Ray Logs	well	9	\$175	\$1,575			
EM-39 Logs	well	9	\$175	\$1,575			
	station	612	\$125	\$76,500			

 $<sup>^{(1)}</sup>$  The monitoring schedule over 30 years was assumed as:

Years 1,2 = quarterly sampling: Years 3 through 30= semi-annual sampling (Based on RCRA Closure Guidelines)

These costs are incorporated in each alternative's cost summary under "Annual Operation and Maintenance."

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT AREA 7 - LEACHATE

ALTERNATIVE SCL-7B: MULTI-PHASE EXTRACTION/ COLLECT LEACHATE AND TREAT BY AIR STRIPPING UNIT / DISCHARGE TO ON-SITE SURFACE WATER / GROUNDWATER USE RESTRICTIONS/MONITORING

DETAILED COST ESTIMATE - COMMENTS

	COMMENTS
ि विस्तिमीतिहरू स्वीतंत्र स्वतंत्र स्वीतंत्र स्वतंत्र स्वतंत्र स्वीतंत्र स्वीतंत्र स्वीतंत्र स्वीतंत्र स्वतंत्र	
·	Cost based on CDM experience
a state that a transfer of the contract of the	<u></u>
	Cost based on CDM experience
treetment building	Based on a 20 foot x 20 foot building - cost based on Butler Building April 1998 cost estimate
electrical supph	Based on CDM experience
Ī	4" diameter, stainless steel construction, 35 foot depth with 10 foot screen - cost based on CDM
extraction well installation	experience of average extraction well installation costs.
	1 pump per well (2 spare) @ 1.2 to 7 gpm flow with/control box each pump - costs based on April 1998
pump materials installation	Grundfos cost estimate
	2" diameter carbon steel pipe, 10 foot linkages from each of the 9 wells to treatment unit (with 15%
2" die. cerbo steel pipe from well to heeder pipe	contingency) - cost based on CDM experience
	4" diameter carbon steel pipe, 10 foot linkages from header pipe to Central Pumping Station (with 15%
	contingency) - cost based on CDM experience
	Includes controls - cost based on CDM experience
	4" diameter carbon steel pipa, 10 foot linkages from Central Pumping Station to treatment unit (with
uni	15% contingency) - cost based on CDM experience
att additional and a second and a second and a second and a second and a second and a second and a second and a	Shallow Tray air stripper model 2631 with options - cost based on April 1998 North East Environmental
air stripping treatment unit and installation	
Electricity	Based on Carbon Air cost estimate
45 dashama sina ta amat	4" diameter carbon steel pipe, 10 foot linkages from treatment unit to Creek (with 15% contingency) -
4 discharge pipe to clean	cost based on CDM experience
	Cost based on CDM experience in monitoring well installation
	Cost based on Cow experience in monitoring well installation
alle for fine for the second of the second o	
	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
	Based on \$60/day rental fee for a field vehicle
	Based on CDM equipment rental rates
<b>T</b>	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
massana acus	Based on average cost incurred for priority pollutants analysis; One duplicate and one blank will be
leachate treatment system laboratory analysis	
The state of the s	- The second sec
Eggs 1953 age of a third they be the	
lebor	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
	Based on \$60/day rental fee for a field vehicle
equipment	Based on CDM equipment rental rates
miscellaneous	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
i e	
	Based on average cost incurred for volatile organic compound analysis; One duplicate and one blank
leachate laboratory analysis	Based on average cost incurred for volatile organic compound analysis; One duplicate and one blank will be collected per 10 samples.
a Milliand State of the state o	will be collected per 10 samples.
Multi-Phase Wells (40 ft., 4 inch PVC with development	will be collected per 10 samples.  Based on CDM experience
Multi-Phase Welts (40 ft., 4 inch PVC with development MPE System including enclosure	will be collected per 10 samples.  Based on CDM experience  Based on Carbon Air cost estimate
Multi-Phase Welts (40 ft., 4 inch PVC with development MPE System including enclosure Piping (2 in. PVC @ 3 ft. bgs)	will be collected per 10 samples.  Based on CDM experience Based on Carbon Air cost estimate Based on CDM experience
Multi-Phase Welts (40 ft., 4 inch PVC with development MPE System including enclosure Piping (2 in. PVC @ 3 ft. bgs) Air Stripper System Expansion	will be collected per 10 samples.  Based on CDM experience Based on CDM experience Based on CDM experience Based on Carbon Air cost estimate
Multi-Phase Welts (40 ft., 4 inch PVC with development MPE System including enclosure Piping (2 in. PVC @ 3 ft. bgs) Air Stripper System Expansion Pilot Study	will be collected per 10 samples.  Based on CDM experience Based on Carbon Air cost estimate Based on CDM experience Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on CDM experience
Multi-Phase Welts (40 ft., 4 inch PVC with development MPE System including enclosure Piping (2 in. PVC @ 3 ft. bgs) Air Stripper System Expansion Pilot Study O&M Meterials and Labor	will be collected per 10 samples.  Based on CDM experience Based on Carbon Air cost estimate Based on CDM experience Based on Carbon Air cost estimate Based on CDM experience Based on CDM experience Based on CDM experience
Multi-Phase Welts (40 ft., 4 inch PVC with development MPE System including enclosure Piping (2 in. PVC @ 3 ft. bgs) Air Stripper System Expansion Pilot Study O&M Meterials and Labor Expanded Air Stripper O & M	will be collected per 10 samples.  Based on CDM experience Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on CDM experience Based on CDM experience Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on Carbon Air cost estimate
Multi-Phase Welts (40 ft., 4 inch PVC with development MPE System including enclosure Piping (2 in. PVC @ 3 ft. bgs) Air Stripper System Expansion Pilot Study O&M Meterials and Labor Expanded Air Stripper O & M Expanded Air Stripper / Catalytic Oxidation	will be collected per 10 samples.  Based on CDM experience Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on CDM experience Based on CDM experience Based on Carbon Air cost estimate
Multi-Phase Welts (40 ft., 4 inch PVC with development MPE System including enclosure Piping (2 in. PVC @ 3 ft. bgs) Air Stripper System Expansion Pilot Study O&M Meterials and Labor Expanded Air Stripper O & M Expanded Air Stripper / Catalytic Oxidation Natural Gas	will be collected per 10 samples.  Based on CDM experience Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on CDM experience Based on CDM experience Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on Carbon Air cost estimate
Multi-Phase Welts (40 ft., 4 inch PVC with development MPE System including enclosure Piping (2 in. PVC @ 3 ft. bgs) Air Stripper System Expansion Pilot Study O&M Meterials and Labor Expanded Air Stripper O & M Expanded Air Stripper / Catalytic Oxidation Netural Ges	will be collected per 10 samples.  Based on CDM experience Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on CDM experience Based on Carbon Air cost estimate Based on CDM experience
Multi-Phase Welts (40 ft., 4 inch PVC with development MPE System including enclosure Piping (2 in. PVC @ 3 ft. bgs) Air Stripper System Expansion Pilot Study O&M Meterials and Labor Expanded Air Stripper O & M Expanded Air Stripper / Catalytic Oxidation Netural Ges	will be collected per 10 samples.  Based on CDM experience Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on CDM experience Based on Carbon Air cost estimate Based on CDM experience  Based on CDM experience
Multi-Phase Welfs (40 ft., 4 inch PVC with development MPE System including enclosure Piping (2 in. PVC @ 3 ft. bgs) Air Stripper System Expansion Pilot Study O&M Meterials and Labor Expanded Air Stripper O & M Expanded Air Stripper / Catalytic Oxidation Netural Gas  Multi-Phase Extraction Monitoring Welle Continuous Recorders for Multi-Phase MWs	will be collected per 10 samples.  Based on CDM experience Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on CDM experience Based on Carbon Air cost estimate Based on CDM experience  Based on CDM experience
Multi-Phase Welts (40 ft., 4 inch PVC with development MPE System including enclosure Piping (2 in. PVC @ 3 ft. bgs) Air Stripper System Expansion Pilot Study O&M Meterials and Labor Expanded Air Stripper O & M Expanded Air Stripper / Catalytic Oxidation Netural Ges Multi-Phase Extraction Monitoring Welle Continuous Recorders for Multi-Phase MWs Pressure Monitoring Points	will be collected per 10 samples.  Based on CDM experience Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on CDM experience Based on Carbon Air cost estimate Based on CDM experience  Based on CDM experience
Multi-Phase Welfs (40 ft., 4 inch PVC with development MPE System including enclosure Piping (2 in. PVC @ 3 ft. bgs) Air Stripper System Expansion Pilot Study O&M Meterials and Labor Expanded Air Stripper O & M Expanded Air Stripper / Catalytic Oxidation Netural Gas Multi-Phase Extraction Monitoring Welle Continuous Recorders for Multi-Phase MWs Pressure Monitoring Points	will be collected per 10 samples.  Based on CDM experience Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on CDM experience Based on Carbon Air cost estimate Based on CDM experience Based on CDM experience Based on CDM experience Based on CDM experience
Multi-Phase Welfs (40 ft., 4 inch PVC with development MPE System including enclosure Piping (2 in. PVC @ 3 ft. bgs) Air Stripper System Expansion Pilot Study O&M Meterials and Labor Expanded Air Stripper (0 & M Expanded Air Stripper / Catalytic Oxidation Natural Gas Multi-Phase Extraction Monitoring Welle Continuous Recorders for Multi-Phase MWs Pressure Monitoring Points Mob/Demob	will be collected per 10 samples.  Based on CDM experience Based on CDM experience Based on Carbon Air cost estimate Based on Carbon Air cost estimate Based on CDM experience Based on Carbon Air cost estimate Based on CDM experience
Multi-Phase Wells (40 ft., 4 inch PVC with development MPE System including enclosure Piping (2 in. PVC @ 3 ft. bgs) Air Stripper System Expansion Pilot Study O&M Meterials and Labor Expanded Air Stripper (0 & M Expanded Air Stripper / Catalytic Oxidation Natural Gas  Multi-Phase Extraction Monitoring Welle Continuous Recorders for Multi-Phase MWs Pressure Monitoring Points  Mob/Demob	will be collected per 10 samples.  Based on CDM experience Based on CDM experience Based on Carbon Air cost estimate Based on CDM experience Based on Carbon Air cost estimate Based on CDM experience
Multi-Phase Welfs (40 ft., 4 inch PVC with development MPE System including enclosure Piping (2 in. PVC @ 3 ft. bgs) Air Stripper System Expansion Pilot Study O&M Meterials and Labor Expanded Air Stripper (0 & M Expanded Air Stripper (Catalytic Oxidation Netural Gas Multi-Phase Extraction Monitoring Welle Continuous Recorders for Multi-Phase MWs Pressure Monitoring Points Mob/Demob Per Diem Gamma Ray Logs	will be collected per 10 samples.  Based on CDM experience Based on CDM experience Based on Carbon Air cost estimate Based on CDM experience Based on Ground Truth Environmental cost estimate Based on Ground Truth Environmental cost estimate Based on Ground Truth Environmental cost estimate
Multi-Phase Wells (40 ft., 4 inch PVC with development MPE System including enclosure Piping (2 in. PVC @ 3 ft. bgs) Air Stripper System Expansion Pilot Study O&M Meterials and Labor Expanded Air Stripper (0 & M Expanded Air Stripper (Catalytic Oxidation Netural Gas  Multi-Phase Extraction Monitoring Welle Continuous Recorders for Multi-Phase MWs Pressure Monitoring Points  Mob/Demob Per Diem Gamma Ray Logs EM-39 Logs	will be collected per 10 samples.  Based on CDM experience Based on CDM experience Based on Carbon Air cost estimate Based on CDM experience Based on Carbon Air cost estimate Based on CDM experience

#### **TABLE 7-23**

## SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT FOCUSED FEASIBILITY STUDY ROCKFORD, ILLINOIS

# AREA 7 - LEACHATE ALTERNATIVE SCL-7C: REACTIVE BARRIER WALL / LEACHATE USE RESTRICTIONS COST SUMMARY

Item/Description	Total Cost
CAPITAL COSTS	
Groundwater Use Restrictions	\$25,000
Reactive Barrier Wall	\$2,573,000
Leachate Monitoring Wells	\$50,000
SUBTOTAL CONSTRUCTION COSTS (1)	\$2,648,000
Bid Contingency (15%)	\$397,000
Scope Contingency (20%)	\$530,000
Engineering and Design (15%)	\$397,000
Oversight/Health and Safety (5%)	\$132,000
TOTAL CAPITAL COSTS	\$4,104,000
ANNUAL OPERATING AND MAINTENANCE COSTS	
Leachate Sampling and Analysis (per event)	\$8,000
TOTAL ANNUAL COSTS	\$8,000
REPLACEMENT COSTS (1)	<del></del>
Iron Rejuvenation (every 10 years)	\$25,000
Monitoring Well Replacement (every 15 years)	\$72,000
TOTAL REPLACEMENT COSTS	\$97,000
PRESENT WORTH ANALYSIS	
Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (2)	\$4,104,000
Quarterly Sampling - years 1 and 2	\$59,000
Semi-annual Sampling - years 3 through 30	\$170,000
Present Worth Replacement Costs (3)	\$58,000
TOTAL PRESENT WORTH	\$4,391,000

<sup>(1)</sup> Replacement costs include construction and oversight capital costs.

<sup>(2)</sup> Capital costs represent the present worth of the given alternative.

<sup>(3)</sup> Present worth of replacement costs is based on a 7% annual discount rate and replacement of monitoring wells every 15 years (twice over 30 year projection) and iron rejuvenation every 10 years (three times over 30 year projection).

## SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT AREA 7 - LEACHATE ALTERNATIVE SCL-7C: REACTIVE BARRIER WALL / LEACHATE USE RESTRICTIONS DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
विकामस्याद्याः । अस्य अस्य स्थान				\$25,000	2		1. 19
legal fees	is	1	\$25,000	\$25,000			
annament and an				37/38/3	. 15 de 177		
motestificam	is	1	\$40,000		\$40,000		
funnel installation	ft²	40,500	\$4		\$162,000		
gate installation	R <sup>2</sup>	10,500	\$150		\$1,575,000		
Iron	ft <sup>3</sup>	18,900	\$40	\$758,000			
jetting well materials and installation	well	2	\$20,000		\$40,000		
# TOPPOS CONTRACTOR				<u>. 1</u> 2	. KOM	20	322
well installation and materials	well	11	\$4,500		\$49,500		
★ Provide the provide							
Mental Commence of the Commenc				200		2.122	. 4
lebor	hours	80	\$60			\$4,800	_
vehicle	days	4	\$60			\$240	
equipment	ls	1	\$600			\$600	
miscellaneous	ls	1	\$1,000			\$500	
leachate laboratory analysis	each	17	\$130			\$2,210	

 $<sup>^{\</sup>left( 0\right) }$  The monitoring schedule over 30 years was assumed as:

Years 1,2 = quarterly sampling: Years 3 through 30= semi-annual sampling (Based on RCRA Closure Guidelines)

These costs are incorporated in each alternative's cost summary under "Annual Operation and Maintenance."

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT

AREA 7 - LEACHATE

ALTERNATIVE SCL-7C: REACTIVE BARRIER WALL / LEACHATE USE RESTRICTIONS

DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
Carl March St. Carl	
legal feet	Cost based on CDM experience
mobilization	Cost based on CDM experience
funnel installation	Cost based on CDM experience
gate installation	Cost based on CDM experience
les.	Cost based on CDM experience
jetting well materials and installation	Cost based on CDM experience
•	
well installation and materials	Cost based on CDM experience in monitoring well installation
· · · · · · · · · · · · · · · · · · ·	
fabor	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
vehicle	Based on \$60/day rental fee for a field vehicle
equipment	Based on CDM equipment rental rates
miscellaneous	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
	Based on average cost incurred for volatile organic compound analysis; One duplicate and one blank will
leachale laboratory analysis	be collected per 10 samples.

#### **TABLE 7-24**

## SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FOCUSED FEASIBILITY STUDY

## SOURCE AREA 9/10 - LEACHATE ALTERNATIVE SCL-9/10A: NO ACTION / MONITORING AND NATURAL ATTENUATION COST SUMMARY

Item/Description		Total Cost
CAPITAL COSTS		
Groundwater Use Restricti	ons	\$25,000
Leachate Monitoring Wells	_	\$18,000
SUBTOTA	L CONSTRUCTION COSTS	\$43,000
Bid Contingency (15%)		\$6,000
Scope Contingency (20%)	i e	\$9,000
Oversight/Health and Safe	ty (5%)	\$2,000
	TOTAL CAPITAL COSTS	\$60,000
ANNUAL OPERATING AND MAINTENANG	CE COSTS	
Leachate Sampling and Ar	alysis (per event)	\$5,000
	TOTAL ANNUAL COSTS	\$5,000
REPLACEMENT COSTS (1)		
Monitoring Well Replacement	ent (every 15 years)	\$29,000
тоти	AL REPLACEMENT COSTS	\$29,000
PRESENT WORTH ANALYSIS		
Total Capital Costs (from a	bove) <sup>(2)</sup>	\$60,000
Present Worth Annual O&	M Costs (2)	
Leachate Sampling and A	nalysis	
Quarterly Sampling - ye		\$37,000
Semi-annual Sampling	-	\$106,000
Present Worth Replaceme	nt Costs <sup>(3)</sup>	\$14,000
	TOTAL PRESENT WORTH	\$217,000

<sup>(1)</sup> Replacement costs include construction and oversight capital costs.

<sup>(2)</sup> Capital costs represent the present worth of the given alternative.

<sup>(3)</sup> Present worth of replacement costs is based on a 7% annual discount rate and replacement of leachate monitoring wells every 15 years (twice over 30 year projection).

## SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT SOURCE AREA 9/10 - LEACHATE ALTERNATIVE SCL-9/10A: NO ACTION / MONITORING AND NATURAL ATTENUATION DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units		Capital Cost	Construction/ Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
हिमालीकाने प्राप्तिकान विभाव 💆 🔠 📉		7		2500	. 3	.i. 🖭	
Legal Foot	is	1	\$25,000	\$25,000			
A Property of the Control of the Con							
well installation and materials	well	4	\$4,500		\$18,000		
<ul> <li>Section 1. Section 1</li></ul>							
The area of the Market				4 44 L		e destruction ,	2
Jabor	hours	20	\$60			\$1,200	
vehicle	day	1	\$60			\$60	
equipment	ls	1	\$600			\$600	
miscellaneous	ls	1	\$1,000			\$500	
leachate laboratory analysis	each	7	\$380			\$2,660	

 $<sup>^{\</sup>scriptsize (1)}$  The monitoring schedule over 30 years was assumed as:

Years 1,2 = quarterly sampling: Years 3 through 30= semi-annual sampling (Based on RCRA Closure Guidelines)

These costs are incorporated in each alternative's cost summary under "Annual Operation and Maintenance."

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT
SOURCE AREA 9/10 - LEACHATE
ALTERNATIVE SCL-8/10A: NO ACTION / MONITORING AND NATURAL ATTENUATION
DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
Statistical State States States	
lagal fees	Cost based on CDM experience
and the second second second	
well installation and materials	Cost based on CDM experience in monitoring well installation
and the state of t	
labor	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
vehicle	Based on \$60/day rental fee for a field vehicle
equipment	Based on CDM equipment rental rates
	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
	Based on average cost incurred for VOCs and bioparameters; One duplicate and one blank will be
leachete laboratory analysis	collected per 10 samples.

#### **TABLE 7-25**

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT FOCUSED FEASIBILITY STUDY ROCKFORD, ILLINOIS

#### AREA 9/10 - LEACHATE

ALTERNATIVE SCL-9/10B: LEACHATE COLLECTION AND TREAT BY AIR STRIPPING UNIT / DISCHARGE TREATED LEACHATE AT OFF-SITE SURFACE WATER / LEACHATE USE RESTRICTIONS COST SUMMARY

item/Description	Total Cost
CAPITAL COSTS	
Groundwater Use Restrictions	\$25,000
Leachate Containment System	\$808,000
Leachate Monitoring Wells	\$23,000
SUBTOTAL CONSTRUCTION COSTS (1)	\$856,000
Bid Contingency (15%)	\$128,000
Scope Contingency (20%)	\$171,000
Engineering and Design (15%)	\$128,000
Oversight/Health and Safety (5%)	\$43,000
TOTAL CAPITAL COSTS	\$1,326,000
ANNUAL OPERATING AND MAINTENANCE COSTS	
Leachate Containment System	\$35,000
Leachate Treatment System Sampling and Analysis	
(per sampling event)	\$4,000
Leachate Sampling and Analysis (per event)	\$3,000
TOTAL ANNUAL COSTS	\$42,000
REPLACEMENT COSTS (2)	
Leachate Containment System (every 15 years)	\$768,000
Monitoring Well Replacement (every 15 years)	\$29,000
TOTAL REPLACEMENT COSTS	\$797,000
PRESENT WORTH ANALYSIS	
Total Capital Costs (from above) (3)	\$1,326,000
Present Worth Annual O&M Costs (4)	\$434,000
Leachate Treatment System Sampling	• • • • • • • • • • • • • • • • • • • •
Quarterly Sampling - years 1 through 30 Leachate Sampling	\$200,000
Quarterly Sampling - years 1 and 2	\$22,000
Semi-annual Sampling - years 1 through 30	\$64,000
	\$394,000
	4004,000
Present Worth Replacement Costs (9)	

- (1) Capital costs for construction items do not include oversight fees.
- (2) Replacement costs include construction and oversight capital costs.
- (3) Capital costs represent the present worth of the given alternative.
- (4) The "Present Worth Annual O&M Cost" line item includes all annual costs except for costs per sampling and analysis event. Costs incurred for sampling and analysis are broken down per sampling schedule as listed. Sampling and analysis costs are based on a 7% discount rate over a 30 year projection (Based on RCRA Closure Guidelines).
- (5) Present worth of replacement costs is based on a 7% annual discount rate and replacement of monitoring wells and leachate containment system (including central pump station, extraction wells, piping, pumps, and air stripping unit) every 15 years (once over 30 year projection).

#### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT AREA \$M0 - LEACHATE

#### ALTERNATIVE SCL-9/10B: LEACHATE COLLECTION AND TREAT BY AIR STRIPPING UNIT / DISCHARGE TREATED LEACHATE AT OFF-SITE SURFACE WATER / LEACHATE USE RESTRICTIONS DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
व्यक्तिवर्षात्राम् स्थापना स्थापना ।				\$25,000	36	. 30	
Lagal Foos	ls.	1	\$25,000	\$25,000	-		
we will be seen a second				2144.74	1. 9.19	4.0.1.0.0	. :
mobilization/demobilization for all	is	1	\$25,000	\$25,000			
treatment building	is	1	\$40,000	\$40,000			
electrical supply	ls	1	\$1,000	\$1,000			
extraction well installation	Nell	55	\$5,800		\$319,000		
pump installation	pump	60	\$2,000	\$120,000	\$6,000	\$15,000	
2" dia. carbon steel pipe from well to header pipe	feet	275	\$25	\$6,875			
4" dia. carbon steel header pipe to Central Pump Station	feet	1,150	\$32	\$36,800			
Central Pump Station	is	1	\$54,500	\$54,500		\$5,000	
4" dia. carbon steel header pipe connected to air stripper unit	feet	50	\$32	\$1,600		ļ ļ	
eir stripping treetment unit and installation	unit	1	\$40,000	\$40,000	\$5,000	\$15,000	
4" cast iron drainage pipe to off-site surface water discharge	feet	3,800	\$40	\$152,000			
Not the second s				230	22.00		₹.
well installation and materials	well	5	\$4,500		\$22,500		
A Committee of the Comm				ران د	4	.23.4.02	
labor	hours	10	\$60			\$600	
vehicle	day	1	\$60			\$60	
equipment	ls	1	\$600			\$600	
miscellaneous	ls	1	\$1,000	i i	<del></del>	\$500	
leachate treatment system laboratory analysis	each	2	\$1,000			\$2,000	
S. Mark R. Charles and S. Marker, Physical Actions of Automorphisms (Control of Control of Contr				٠.		50,000	- 1)
labor	hours	20	\$60			\$1,200	
vehicle	day	1	\$60	1	_	\$60	•
equipment	is	1	\$600			\$600	
miscellaneous	ls	1	\$1,000			\$500	•
Leachate laboratory analysis	each	8	\$130	<del>                                     </del>		\$1,040	

 $<sup>^{\</sup>mbox{\scriptsize fit}}$  The monitoring schedule over 30 years was assumed as:

Years 1,2 = quarterly sampling: Years 3 through 30= semi-annual sampling (Based on RCRA Closure Guidelines)

These costs are incorporated in each alternative's cost summary under "Annual Operation and Maintenance."

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#### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT

AREA 9/10 - LEACHATE
ALTERNATIVE SCL-9/10B: LEACHATE COLLECTION AND TREAT BY AIR STRIPPING UNIT / DISCHARGE TREATED LEACHATE AT OFF-SITE SURFACE WATER / LEACHATE USE RESTRICTIONS DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
Emerginary from M. Co.	
legal feed	Cost based on CDM experience
♠ 2 Tell (14 Model) of 1 tells of a	
mobilization/demobilization for al	Cost based on CDM experience
treatment building	Based on a 20 foot x 20 foot building - cost based on Butter Building April 1998 cost estimate
	4" diameter, stainless steel construction, 35 foot depth with 10 foot acreen - cost based on CDM
extraction well installation	experience of average extraction well installation costs.
	2 pumps per well (1 spare) @ 1.2 to 7 gpm flow with/control box each pump - costs based on April 1998
pump installation	Grundfos cost estimete
	2" diameter carbon steel pipe, 10 foot linkages from each of the 55 wells to treatment unit (with 15%
2" die. cerbon eteel pipe from well to heeder	contingency) - cost based on CDM experience
	4" diameter carbon steel pipe, 10 foot linkages from main line to Central Pumping Station (with 15%
• • • • • • • • • • • • • • • • • • • •	contingency) - cost based on CDM experience
Central Pump Station	Includes controls - cost based on CDM experience
	4" diameter carbon steel pipe, 10 foot linkages from Central Pumping Station to treatment unit (with 15%
4" dia. carbon afeel pipe connected to air stripper uni	contingency) - cost based on CDM experience
	Shallow Tray air stripper model 41251 with options - cost based on April 1998 North East Environmental
air stripping treatment unit and installation	
	4" diameter cast iron pipe, form treatment unit to off-site surface water discharge (with 15% contingency)
4" cast iron discharge pipe to off-alle aurisce water	cost besed on CDM experience
well installation and motorials	Cost based on CDM experience in monitoring well installation
lahor	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
vehicle	Based on \$60/day rental fee for a field vehicle
equipment	Based on CDM equipment rental rates
miecelleneous	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
	Based on average cost incurred for priority pollutants analysis; One duplicate and one blank will be
leachele treatment system laboratory analysis	collected per 10 samples.
Antonio (n. 1865) Notae Notae (n. 1865)	
	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
	Based on \$300/week rental fee for a field vehicle
7-1-1-1	Based on CDM equipment rental rates
	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
Magazinacou	Based on average cost incurred for VOC analysis; One duplicate and one blank will be collected per 10
leschele leboratory enelysis	
neuron municipy erayun	

## TABLE 7-26 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FOCUSED FEASIBILITY STUDY

## SOURCE AREA 9/10 ALTERNATIVE SCL-9/10C: AIR SPARGING (AS) ALONG GMZ BOUNDARY / MONITORING / GROUNDWATER USE RESTRICTIONS COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	Groundwater Use Restrictions	\$25,000
	General	\$1,038,00
	Leachate Monitoring Wells	\$23,00
	VRS	\$232,00
	Air Sparging	\$161,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$1,479,000
	Bid Contingency (15%)	\$222,000
	Scope Contingency (20%)	\$296,000
	Engineering and Design (15%)	\$222,000
	Oversight/Health and Safety (5%)	\$74,000
	TOTAL CAPITAL COSTS	\$2,293,000
	Leachate Sampling and Analysis (per event) VRS Regular Maintenance/Electrical Regular System Maintenance/Flectrical	\$26,000
		\$26,000 \$36,000
REPLACEMENT C	VRS Regular Maintenance/Electrical Regular System Maintenance/Electrical TOTAL ANNUAL COSTS	\$26,000 \$36,000
REPLACEMENT C	VRS Regular Maintenance/Electrical Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  OSTS  Monitoring Wells (every 15 years)	\$3,000 \$26,000 \$36,000 \$65,000
REPLACEMENT C	VRS Regular Maintenance/Electrical Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  OSTS  Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) -	\$26,000 \$36,000 \$65,000 \$29,000
REPLACEMENT C	VRS Regular Maintenance/Electrical Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  OSTS  Monitoring Wells (every 15 years)	\$26,000 \$36,000 \$65,000
REPLACEMENT C	VRS Regular Maintenance/Electrical Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  OSTS  Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) -	\$26,000 \$36,000 \$65,000 \$29,000 \$15,000
	VRS Regular Maintenance/Electrical Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  OSTS  Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$26,000 \$36,000 \$65,000 \$29,000
	VRS Regular Maintenance/Electrical Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  OSTS  Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$26,000 \$36,000 \$65,000 \$29,000 \$15,000
REPLACEMENT C	VRS Regular Maintenance/Electrical Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  OSTS  Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$26,000 \$36,000 \$65,000 \$29,000 \$15,000 \$44,000
	VRS Regular Maintenance/Electrical Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  OSTS  Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$26,000 \$36,000 \$65,000 \$29,000 \$15,000 \$44,000 \$2,293,000
	VRS Regular Maintenance/Electrical Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  OSTS  Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  I ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4)	\$26,000 \$36,000 \$65,000 \$29,000 \$15,000 \$44,000 \$2,293,000
	VRS Regular Maintenance/Electrical Regular System Maintenance/Electrical TOTAL ANNUAL COSTS  OSTS  Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  I ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4) Leachate Sampling	\$26,000 \$36,000 \$65,000 \$29,000 \$15,000 \$44,000 \$2,293,000 \$807,000
	VRS Regular Maintenance/Electrical Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  OSTS  Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  I ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4) Leachate Sampling Quarterly Sampling - years 1 and 2	\$26,000 \$36,000 \$65,000 \$29,000 \$15,000 \$44,000 \$2,293,000 \$807,000

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years.

<sup>(5)</sup> Present worth of replacement costs is based on a 7% annual discount rate and replacement of system equipment and leachate monitoring wells every 15 years (once over 30 year projection).

#### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 9/10

#### ALTERNATIVE SCL-9/10C: AIR SPARGING (AS) ALONG GMZ BOUNDARY / MONITORING / GROUNDWATER USE RESTRICTIONS DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
विकास वापाल कर कर कर विकास मान				25000	35	10	30
Lagal Fees	is	1	\$25,000	\$25,000			
,c. , .				19.00			
construction trailer (rental and delivery)	mo	360	\$275	\$99,000			
mobilization	İs	1	\$1,000	\$1,000			
demobilization	18	1	\$1,000	\$1,000			
decon facilities	98	1	\$1,000	\$1,000			
health and safety equipment	mo	360	\$2,000	\$720,000			
electrical power service supply	mo	360	\$400	\$144,000			
water supply	mo	360	\$200	\$72,000			
				:			;
well installation and materials	well	5	\$4,500		\$22,500		
Market State of the Company of the C						<u></u>	<u> </u>
VRS well installation	<b>00</b> .	6	\$6,000		\$36,000	I	
VRS mein system	is	11	\$14,000	\$14,000	\$5,000	\$10,000	
VRS control penels	ls	11	\$3,000	\$3,000	\$1,000	\$500	
6" cerbon steel piping	ft	800	<b>\$</b> 57	\$45,600			
4" carbon steel piping	<u>ft</u>	50	\$32	\$1,600			
excevation for piping placement	<u>ft</u>	850	\$0.67		\$570		
electrical power requirements (10 HP)	yr.	1	\$10,000			\$10,000	
SVE treatment building	sf	400	\$100	\$40,000	included	]	
ainweter seperator tank	ls _	1	\$5,000	\$5,000		\$1,000	
carbon adsorption of emission	ls	_1	\$80,000	\$80,000	included	\$4,000	
kan kan di disebah kan di penghah di dianggan beraja. MRMMAN kan di disebah di digan di kelalah di					2	24.0%	30
iebor	hours	20	\$60			\$1,200	
vehicle	day	1	\$60			\$60	
equipment	ls	1	\$600			\$600	
miscullaneous	ls.	1	\$1,000			\$500	
Leachate laboratory analysis	each	8	\$130			\$1,040	
A company of the A				• 75 - 3 1	129.JE	Madie.	
AS well installation	68	10	\$6,000		\$60,000		
AS main system	ls	1	\$18,000	\$18,000	\$6,000	\$10,000	
AS control panels	ls	1	\$3,000	\$3,000	\$1,500	\$500	
6" cerbon ateal piping	ft	1150	\$57	\$65,550	I		
4" cerbon steel piping	ft	200	\$32	\$6,400		1	
excevation for piping placement	ft	1350	\$0.67		\$905	T	
electrical power requirements (25 HP)	year	1	\$25,000			\$25,000	
AS treatment building	Costs for AS I	reatment buildin	g included with	comesponding VRS			
air/water separator tenk	Costs for air/e	rater separator t	ank included wi	th corresponding Vi	₹S		
activated carbon treatment	Costs for activ	reted carbon air	treatment includ	ded with correspond	ing VRS	- T	

#### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 9/10

### ALTERNATIVE SCL-9/10C: AIR SPARGING (AS) ALONG GMZ BOUNDARY / MONITORING / GROUNDWATER USE RESTRICTIONS DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
লাল্যাক্র্যুক্ত কেন্দ্র করে ক্লান্ত	
legal fees	Cost based on CDM experience
89(07)	
construction trailer (rental and delivery)	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
	Heavy equipment and trailers, per vendor estimate
	Allowance for trailer and equipment demobilization
	Based on level of personal and vehicle decontamination anticipated for this alternative
	Allowance based on CDM equipment rates
	Based on expected electrical costs per month for this alternative
	Based on expected use per month for this alternative (e.g., decon, personnel use)
and the district of the product of the second	
	Cost based on CDM experience in monitoring well installation
And the second of the second o	The state of the s
	Cost associated with installation of SVE wells. Based on CDM experience.
The state of the s	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator,
	condensate transfer pump, high condens. level alarm, vac. relief valve, vac. gauges, skid mnting
VRS main system	interconnecting piping and a manual motor start switch
	Vendor estimate - NEEP (May 1998)
•	based on CDM experience
	based on CDM experience
	12" wide trench and backfill, 36" deep as per 1996 Means
	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
	Basic prefabricated building on concrete pad. Based on CDM experience.
-	Based on CDM experience
•	
	Based on CDM experience
	Deceded to 40 hours and docast the surrose CDM lebes anto of 600 for surround
	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
	Based on \$300/week rental fee for a field vehicle
	Based on CDM equipment rental rates
miscellaneous	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
	Based on average cost incurred for VOC analysis; One duplicate and one blank will be collected
leachate laboratory analysis	per 10 samples.
No. 25 and a first first	On the state of th
AS well installation	Cost associated with installation of AS wells. Based on CDM experience.
AS main system	Vendor: includes blower, exp motor, inline silencer, pressure relief valve, unitized base, pressure
	gauge and a manual motor starting switch.
•	Vendor estimate
,, -,	Based on CDM experience
	Based on CDM experience
, , , ,	12" wide trench and backfill, 36" deep as per 1996 Means
	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
	Costs for AS treatment building included with corresponding VRS
	Costs for air/water separator tank included with corresponding VRS
activated carbon treatment	Costs for activated carbon air treatment included with corresponding VRS

#### **TABLE 7-27**

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT FOCUSED FEASIBILITY STUDY ROCKFORD, ILLINOIS

## AREA 9/10 - LEACHATE ALTERNATIVE SCL-9/10D: REACTIVE BARRIER WALL / LEACHATE MONITORING/ GROUNDWATER USE RESTRICTIONS COST SUMMARY

	Item/Description	Total Cost
CAPITAL C	OSTS	
	Groundwater Use Restrictions	\$25,000
	Reactive Barrier Wall	\$2,073,000
	Leachate Monitoring Wells	\$50,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$2,148,000
	Bid Contingency (15%)	\$322,000
	Scope Contingency (20%)	\$430,000
	Engineering and Design (15%)	\$322,000
	Oversight/Health and Safety (5%)	\$107,000
	TOTAL CAPITAL COSTS	\$3,329,000
ANNUAL O	PERATING AND MAINTENANCE COSTS	
	Lookata Campling and Applicate (consuma)	<b>e</b> E 000
	Leachate Sampling and Analysis (per event)	\$5,000
	Leachate Sampling and Analysis (per event)  TOTAL ANNUAL COSTS	\$5,000 \$5,000
REPLACEM		
REPLACE	TOTAL ANNUAL COSTS	\$5,000
REPLACEN	TOTAL ANNUAL COSTS	
REPLACEN	TOTAL ANNUAL COSTS  MENT COSTS (1)  Iron Replacement (every 10 years)	\$5,000 \$25,000
	TOTAL ANNUAL COSTS  MENT COSTS (1)  Iron Replacement (every 10 years)  Monitoring Well Replacement (every 15 years)	\$5,000 \$25,000 \$58,000
	TOTAL ANNUAL COSTS  MENT COSTS (1)  Iron Replacement (every 10 years)  Monitoring Well Replacement (every 15 years)  TOTAL REPLACEMENT COSTS  WORTH ANALYSIS  Total Capital Costs (from above) (3)	\$5,000 \$25,000 \$58,000
	IFOTAL ANNUAL COSTS  Ifon Replacement (every 10 years) Monitoring Well Replacement (every 15 years)  TOTAL REPLACEMENT COSTS  WORTH ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (2)	\$25,000 \$25,000 \$58,000 \$83,000
	Iron Replacement (every 10 years) Monitoring Well Replacement (every 15 years)  TOTAL REPLACEMENT COSTS  WORTH ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (2) Quarterly Sampling - years 1 and 2	\$5,000 \$25,000 \$58,000 \$83,000 \$3,329,000 \$37,000
	Iron Replacement (every 10 years) Monitoring Well Replacement (every 15 years)  TOTAL REPLACEMENT COSTS  WORTH ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (2) Quarterly Sampling - years 1 and 2 Semi-annual Sampling - years 3 through 30	\$25,000 \$25,000 \$58,000 \$83,000 \$3,329,000 \$37,000 \$106,000
	Iron Replacement (every 10 years) Monitoring Well Replacement (every 15 years)  TOTAL REPLACEMENT COSTS  WORTH ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (2) Quarterly Sampling - years 1 and 2	\$5,000 \$25,000 \$58,000 \$83,000

<sup>(1)</sup> Replacement costs include construction and oversight capital costs.

<sup>(2)</sup> Capital costs represent the present worth of the given alternative.

<sup>(3)</sup> Present worth of replacement costs is based on a 7% annual discount rate and replacement of monitoring wells every 15 years (once over 30 year projection) and iron replacement every 10 years (twice over 30 year projection).

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT AREA \$10 - LEACHATE

### ALTERNATIVE SCL-8/10D: REACTIVE BARRIER WALL / LEACHATE MONITORING/ GROUNDWATER USE RESTRICTIONS DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
STATE TO THE LEVEL OF THE STATE			1	25,000	-30	<b>10</b>	(3)
legal food	ls	1	\$25,000	\$25,000			
TO THE STREET STREET				\$10000	55,45,000		31
mobilization	ls	1	\$40,000		\$40,000		
funnel installation	ft²	43,250	\$4		\$173,000		
gate installation	n²	10,000	\$150		\$1,500,000		
non!	U <sub>2</sub>	8,000	\$40	\$320,000		*	
jetting well materials and installation	well	2	\$20,000		\$40,000	r	
<ul> <li>April 1 (a) Sept. Application.</li> </ul>				2)	到表现		25
well installation and materials	well	11	\$4,500		\$49,500		
lebor	hours	40	\$60			\$2,400	
vehicle	days	2	\$60			\$120	
equipment	ls	1	\$600			\$800	
miscellaneous	ls	1	\$1,000			\$500	
leachate laboratory analysis	each	14	\$130		<u> </u>	\$1,820	

 $<sup>^{\</sup>rm fit}$  The monitoring schedule over 30 years was assumed as:

Years 1,2 = quarterly sampling: Years 3 through 30= semi-annual sampling (Based on RCRA Closure Guidelines)

These costs are incorporated in each alternative's cost summery under "Annual Operation and Maintenance."

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT

AREA 8/10 - LEACHATE

ALTERNATIVE SCL-8/10D: REACTIVE BARRIER WALL / LEACHATE MONITORING/ GROUNDWATER USE RESTRICTIONS

DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
Figure 44 Children St. 15 Co. 15	
legal feed	Cost based on CDM experience
31 1-1216 1-17 3 15	<u> </u>
mobilization	Cost Based on CDM experience
funnal installation	Cost Based on CDM experience
gete installetton	Cost Based on CDM experience
and the same of th	Cost Based on CDM experience
jutting well materials and installation	Cost based on CDM experience
well installation and materials	Cost based on CDM experience in monitoring well installation
labor	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
	Based on \$60/day rental fee for a field vehicle
• •	Based on CDM equipment rental rates
	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
	Based on average cost incurred for volatile organic compound analysis; One duplicate and one blank will
feechate faboratory analysis	be collected per 10 samples.

## TABLE 7-28 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FOCUSED FEASIBILITY STUDY

#### **SOURCE AREA 9/10**

### ALTERNATIVE SCL-9/10E: AIR SPARGING (AS) ALONG GMZ BOUNDARY AND SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	Groundwater Use Restrictions	\$25,000
	General	\$1,038,000
	Lechate Monitoring Wells	\$23,000
	VRS	\$423,000
	Air Sparging	\$231,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$1,740,000
	Bid Contingency (15%)	\$261,000
	Scope Contingency (20%)	\$348,000
	Engineering and Design (15%)	\$261,000
	Oversight/Health and Safety (5%)	\$87,000
	TOTAL CAPITAL COSTS	\$2,697,000
ANNUAL OPERA	TING AND MAINTENANCE COSTS	
	VRS Regular Maintenance/Electrical	\$26,000
	VRS Regular Maintenance/Electrical Leachate Sampling and Analysis (per event)	- •
		\$3,000
	Leachate Sampling and Analysis (per event)	\$3,000 \$36,000
REPLACEMENT (	Leachate Sampling and Analysis (per event) Regular System Maintenance/Electrical TOTAL ANNUAL COSTS	\$3,000 \$36,000
REPLACEMENT (	Leachate Sampling and Analysis (per event) Regular System Maintenance/Electrical TOTAL ANNUAL COSTS	\$3,000 \$36,000 \$65,000
REPLACEMENT (	Leachate Sampling and Analysis (per event) Regular System Maintenance/Electrical TOTAL ANNUAL COSTS COSTS	\$3,000 \$36,000 \$65,000
REPLACEMENT (	Leachate Sampling and Analysis (per event) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  COSTS  Leachate Monitoring Wells (every 15 years)	\$26,000 \$3,000 \$36,000 \$65,000 \$29,000 \$30,000
REPLACEMENT (	Leachate Sampling and Analysis (per event) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) -	\$3,000 \$36,000 \$65,000 \$29,000 \$30,000
	Leachate Sampling and Analysis (per event) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$3,000 \$36,000 \$65,000 \$29,000 \$30,000
	Leachate Sampling and Analysis (per event) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$3,000 \$36,000 \$65,000 \$29,000
	Leachate Sampling and Analysis (per event) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  H ANALYSIS  Total Capital Costs (from above) (3)	\$3,000 \$36,000 \$65,000 \$29,000 \$30,000 \$59,000
	Leachate Sampling and Analysis (per event) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$3,000 \$36,000 \$65,000 \$29,000 \$30,000 \$59,000 \$2,697,000
	Leachate Sampling and Analysis (per event) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  H ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4)	\$3,000 \$36,000 \$65,000 \$29,000 \$30,000 \$59,000 \$2,697,000 \$807,000
	Leachate Sampling and Analysis (per event) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  H ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4) Leachate Sampling Quarterly Sampling - years 1 and 2 Semi-annual Sampling - years 3 through 30	\$3,000 \$36,000 \$65,000 \$29,000 \$30,000 \$59,000 \$2,697,000
REPLACEMENT O	Leachate Sampling and Analysis (per event) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  H ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4) Leachate Sampling Quarterly Sampling - years 1 and 2	\$3,000 \$36,000 \$65,000 \$29,000 \$30,000 \$59,000 \$2,697,000 \$807,000

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years.

<sup>(5)</sup> Present worth of replacement costs is based on a 7% annual discount rate and replacement of system equipment every 15 years (once over 30 year projection).

## SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 9/10 ALTERNATIVE SCL-9/10E: AIR SPARGING (AS) ALONG GMZ BOUNDARY AND SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS DETAILED COST ESTIMATE

					Construction/	Start-up &	
					Installation	Annual O&M	Baseline
COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Costs	Costs	Costs
विश्ववादिश्य विश्ववित्र प्रति । विश्ववित्र विश्ववित्र ।				25,000	- 10	30.	e Tr
legal fees	ls.	1 1	\$25,000	\$25,000			
, C - , - ,						1	30
construction trailer (rental and delivery)	ma	360	\$275	\$99,000			
mobilization	ls	1	\$1,000	\$1,000			
demobilization	18	1	\$1,000	\$1,000			
decon fecilities	68	1	\$1,000	\$1,000			
health and safety equipment	mo	360	\$2,000	\$720,000			
electrical power service supply	mo	360	\$400	\$144,000			
water supply	mo	360	\$200	\$72,000			
No. 100					* **		21
well installed on and materials	well	5	\$4,500		\$22,500		
Market Reserve of the St.				,'	;	2.19	3
iebor	hours	20	\$60			\$1,200	
vehicle	day	1	\$60			\$60	
equipment	<u>ls</u>	1	\$600			\$600	
miscallaneous	ls .	1	\$1,000			\$500	
Leachate laboratory analysis	each	7	\$130			\$910	<del> </del>
William Demokratic grassy process of the Art			22.020	2300,24	17 U.	. ZvzdV .	als .
VRS well installation	88.	10	\$6,000	044.000	\$60,000		
VRS main system	ls	2	\$14,000	\$14,000	\$5,000	\$10,000	
VRS control penels	ls .	2	\$3,000	\$3,000	\$1,000	\$500	
6" carbon steel piping	ft ft	1530 50	\$57 \$32	\$87,210 \$1,600			
4° carbon steel piping	n ft		\$0.67	\$1,000	\$1,059		
excevation for piping placement		1580 1	\$20,000		<b>∌1,∪38</b>	\$10,000	
electrical power requirements (10 HP)   VRS treatment building (two buildings)	yr.	800	\$100	\$80,000	included	\$10,000	
VKS treament building (till buildings) einweter seperator tank	ls	2	\$5,000	\$10,000	***************************************	\$1,000	
cerbon edecrption of emission	is .	2	\$80,000	\$160,000	included	\$4,000	<del> </del>
Service Servic			700,000	100,000	. '4	3	14,
AS well installation	68	15	\$6,000		\$90,000		
AS main system	ls.	1	\$18,000	\$18,000	\$6,000	\$10,000	
AS control penels	la	1	\$3,000	\$3,000	\$1,500	\$500	
6° cerbon steel piping	Nf .	1750	\$57	\$99,750			
4" cerbon steel piping	H	350	\$32	\$11,200			
excevation for piping placement	If	2100	\$0.67		\$1,407		
electrical power requirements (25 HP)	year	1	\$25,000			\$25,000	<del></del>
				corresponding VRS	,		·····
· 1			<del></del>	th corresponding VI			
activated carbon treatment							

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 9/10 ALTERNATIVE SCL-9/10E: AIR SPARGING (AS) ALONG GMZ BOUNDARY AND SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS

#### DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
्राकान्यक्तात्वा । प्रशास्त्रकात्वाकार्यः । भारतस्त्रकात्वाकार्यः ।	
lecal fact	Cost based on CDM experience
C C L C C	<u> </u>
	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
	Heavy equipment and trailers, per vendor estimate
	Allowance for trailer and equipment demobilization
	Based on level of personal and vehicle decontamination anticipated for this alternative
	Allowance based on CDM equipment rates
	Based on expected electrical costs per month for this alternative
	Based on expected use per month for this alternative (e.g., decon, personnel use)
14	
well installation and materials	Cost based on CDM experience in monitoring well installation
	A STATE OF THE STA
lator	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
	Based on \$300/week rental fee for a field vehicle
	Based on CDM equipment rental rates
1	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
	Based on average cost incurred for VOC analysis; One duplicate and one blank will be collected
leachate laboratory analysis	· · · · · · · · · · · · · · · · · · ·
Notice of Cherry Straggers and Albert	
	Cost associated with installation of SVE wells. Based on CDM experience.
	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator,
}	condensate transfer pump, high condens, level alarm, vac. relief valve, vac. gauges, skid mnting,
VRS main system	interconnecting piping and a manual motor start switch
<b>1</b>	Vendor estimate - NEEP (May 1998)
6" carbon steel pipe	based on CDM experience
4" carbon steel pipe	based on CDM experience
excavation for piping placement (5 foot depth)	12" wide trench and backfill, 36" deep as per 1996 Means
electrical power requirements (10 HP)	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
VRS treatment building	Basic prefabricated building on concrete ped. Based on CDM experience.
air/water separator tank	Based on CDM experience
activeted cerbon	Based on CDM experience
the state of the s	
AS well installation	Cost associated with installation of AS wells. Based on CDM experience.
AS main system	Vendor: includes blower, exp motor, inline silencer, pressure relief valve, unitized base, pressure
	gauge and a manual motor starting switch.
•	Vendor estimate
	Based on CDM experience
	Based on CDM experience
	12" wide trench and backfill, 36" deep as per 1996 Means
	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
	Costs for AS treatment building included with corresponding VRS
	Costs for air/water separator tank included with corresponding VRS
activated carbon treatment	Costs for carbon air treatment included with corresponding VRS

#### **TABLE 7-29**

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FOCUSED FEASIBILITY STUDY

## SOURCE AREA 11 - LEACHATE ALTERNATIVE SCL-11A: NO ACTION / LEACHATE MONITORING/ NATURAL ATTENUATION/ GROUNDWATER USE RESTRICTIONS COST SUMMARY

ttem/Description	Total Cost
CAPITAL COSTS	
Groundwater Use Restrictions	\$25,000
Leachate Monitoring Wells	\$18,000
SUBTOTAL CONSTRUCTION COSTS	\$43,000
Bid and Scope Contingency (20%)	\$9,000
Oversight/Health and Safety (5%)	\$2,000
TOTAL CAPITAL COSTS (1)	\$54,000
ANNUAL OPERATING AND MAINTENANCE COSTS	<del></del>
Leachate Sampling and Analysis (per event)	\$8,000
TOTAL ANNUAL COSTS	\$8,000
REPLACEMENT COSTS (2)	. ". ""
Monitoring Well Replacement (every 15 years)	\$29,000
TOTAL REPLACEMENT COSTS	\$29,000
PRESENT WORTH ANALYSIS	
Total Capital Costs (from above) (3)	\$54,000
Present Worth Annual O&M Costs <sup>(4)</sup> Leachate Sampling	
Quarterly Sampling - years 1 and 2	\$59,000
Semi-annual Sampling - years 3 through 30	\$170,000
Present Worth Replacement Costs (5)	\$14,000
TOTAL PRESENT WORTH	\$297,000

- (1) Capital costs for construction items do not include oversight fees.
- (2) Replacement costs include construction and oversight capital costs.
- (3) Capital costs represent the present worth of the given alternative.
- (4) The "Present Worth Annual O&M Cost" line item includes all annual costs except for costs per sampling and analysis event. Costs incurred for sampling and analysis are broken down per sampling schedule as listed. Sampling and analysis costs are based on a 7% discount rate over a 30 year projection (Based on RCRA Closure Guidelines).
- (5) Present worth of replacement costs is based on a 7% annual discount rate and replacement of monitoring wells replacement every 15 years.

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT SOURCE AREA 11 - LEACHATE

#### ALTERNATIVE SCL-11A: NO ACTION / LEACHATE MONITORING/ NATURAL ATTENUATION/ GROUNDWATER USE RESTRICTIONS DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ installation Costs	Annual O&M Costs	Start-up & Baseline Costs
(विक्रमान) एक एक एक अनुवासन				3.00		75	
Lagal Food	ls	1	\$25,000	\$25,000			
Market and the state of the sta							
well installation and materials	well	4	\$4,500		\$18,000		
· · · · · · · · · · · · · · · · · · ·							
Burton Committee Committee				19.	1	Léulai.	
lebor	hours	60	\$60			\$3,600	
vehicle	day	3	\$60	i		\$180	
equipment	ls	1	\$1,000			\$600	-
miscellaneous	is	1	\$1,500			\$500	
leachate laboratory analysis	each	8	\$380			\$3,040	

 $<sup>^{(</sup>l)}$  The monitoring schedule over 30 years was assumed as:

Years 1,2 = quarterly sampling: Years 3 through 30= semi-annual sampling (Based on RCRA Closure Guidelines)

These costs are incorporated in each alternative's cost summary under "Annual Operation and Maintenance."

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT SOURCE AREA 11 - LEACHATE

#### ALTERNATIVE SCL-11A: NO ACTION / LEACHATE MONITORING/ NATURAL ATTENUATION/ GROUNDWATER USE RESTRICTIONS\_ DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
18 18 18 18 18 18 18 18 18 18 18 18 18 1	
lagal foor	Cost based on CDM experience
No second to the	
well bedeiteten and meterials	Cost based on CDM experience in monitoring well installation
	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
vehicle	Based on \$60/day rental fee for a field vehicle
equipment	Based on CDM equipment rantal rates
	incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
	Based on average cost incurred for VOCs and bioparameters; One duplicate and one blank will be
leechate laboratory analysis	collected per 10 samples.

#### APPENDIX D.1

#### DETAILED COST BACKUP

#### CATALYTIC OXIDATION VS. GRANULAR ACTIVATED CARBON

#### ALTERNATIVE SCS-4C

## TABLE 7-3 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

### SOURCE AREA 4 ALTERNATIVE SCS-4C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	General	\$3,000
	Soil Vapor Extraction (with emission controls)	\$206,000
	Catalytic Oxidation System	\$134,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$343,000
	Bid Contingency (10%)	\$34,000
	Scope Contingency (10%)	\$34,000
	Engineering and Design (15%)	\$51,000 \$51,000
	Oversight/Health and Safety (5%)	\$17,000
	TOTAL CAPITAL COSTS	\$479,000
	Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Post Treatment Sampling	\$18,000 \$22,000 \$63,160 \$32,000
		\$32,000
	TOTAL ANNUAL COOPE	6425 460
	TOTAL ANNUAL COSTS	\$135,160
REPLACEMENT (		\$135,160
REPLACEMENT (		<b>\$135,160</b>
REPLACEMENT (	COSTS	\$0
	COSTS  None  TOTAL REPLACEMENT COSTS (2)	· · · · · · · · · · · · · · · · · · ·
	COSTS  None  TOTAL REPLACEMENT COSTS (2)	\$0
	None  TOTAL REPLACEMENT COSTS (2)  H ANALYSIS	\$0 <b>\$0</b>
PRESENT WORT	None  TOTAL REPLACEMENT COSTS (2)  H ANALYSIS  Total Capital Costs (from above) (3)	\$0 \$0 \$479,000

- (1) Capital costs for construction items do not include oversight fees, which are accounted for separately.
- (2) Replacement costs include construction and oversight capital costs.
- (3) Capital costs represent the present worth of the given alternative.
- (4) Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years.

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4 ALTERNATIVE SCS-4C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
7777			. 4	\$3,000	: 19	18,500	E
construction trailer (rental and delivery)	уr	1	\$3,300			\$3,300	
mobilization	ls	1	\$1,000	\$1,000			
demobilization	lş.	1	\$1,000	\$1,000			
decon facilities	68.	1	\$1,000	\$1,000			
health and safety equipment	yr	1	\$9,000			\$9,000	
electrical power service supply	ÿr	1	\$3,600			\$3,600	
water supply	yr	1	\$2,400			\$2,400	
to the first of the second of the first terms of th				22.86.276	×2, 73	12 mil	
SVE well installation	68.	3	\$6,000		\$18,000		
SVE main system	ls	1	\$14,000	\$14,000	\$5,000	\$10,000	
SVE control penels	ls	1	\$3,000	\$3,000	\$1,000	\$500	
6" carbon steel piping	ft	210	\$57	\$11,970			
4" carbon steel piping	ft	110	\$32	\$3,520			
excevation for piping placement	ft	320	\$0.67		\$214		
electrical power requirements (10 HP)	yr.	1	\$10,000			\$10,000	
SVE treatment building	sf	800	\$180	\$144,000	included		
air/water separator tank	ls	1	\$5,000	\$5,000		\$1,000	
n e ye e <b>vê e e</b> dê e e niş ye.				212 30		iga, sa	31
Catalytic Oxidation Unit	ls	1	\$134,000	\$134,000	included	\$10,000	
Natural Gas	is	1	\$7,000			\$7,000	
Catalyst Replacement	68.	9	\$7,200			\$2,160	
Sempling	68.	8	\$5,500			\$44,000	
Notes to the second of the sec					2	37.22	22
Test Kits/ Field Screening (per year)	samples	11	\$300			\$3,300	
Laboratory Analysis (VOCs, N, P) (per year)	samples	131	\$200			\$26,200	
shipping and handling (per year)	shipmt	24	\$100			\$2,400	

<sup>(1)</sup> All Post Treatment Sampling costs are presented in costs per number of samples and shipments required per year - costs are presented as annual O&M costs

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4 ALTERNATIVE SCS-4C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION DETAILED COST ESTIMATE - COMMENTS

123

COST COMPONENT	COMMENTS
(e)Tttt	
	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
mobilization	Heavy equipment and trailers, per vendor estimate
demobilization	Allowance for trailer and equipment demobilization
decon facilities	Based on level of personal and vehicle decontamination anticipated for this alternative
health and safety equipment	Allowance based on CDM equipment rates
Secret Market was a probability of probability	
SVE well installation	Cost associated with installation of SVE wells. Based on CDM experience.
	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator,
	condensate transfer pump, high condens, level alarm, vac. relief valve, vac. gauges, skid mnting,
SVE main system	interconnecting piping and a manual motor start switch
SVE control panels	Vendor estimate - NEEP (May 1998)
6" carbon steel pipe	Based on CDM experience
4" carbon steel pipe	Based on CDM experience
excavation for piping placement (5 foot depth)	12" wide trench and backfill, 36" deep as per 1996 Means
electrical power service supply	Based on expected electrical costs per month for this alternative
water supply	Based on expected use per month for this atternative (e.g., decon, personnel use)
electrical power requirements (10 HP)	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
SVE treatment building	Basic prefabricated building on concrete pad. Based on CDM experience.
en till glyggte i kviktet i ellerga legty gallis	
Catalytic Oxidation Unit	Vendor estimate - Global Technologies, Inc (May 2000)
Natural Gas	Vendor estimate - Global Technologies, Inc (May 2000)
Catalyst Replacement	Vendor estimate - Global Technologies, Inc (May 2000)
Sampling	Based on CDM experience
District the subject of the	
	Based on CDM experience and average test kit costs - ~25 samples per test kit; samples
Test Kits/ Field Screening (per year)	collected on a grid of 1 sample/250 cy contam. mat'l; 1 sampling grid per 2 weeks
	Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of 1
Laboratory Analysis (VOCs, N, P) (per year)	sample/250cy contam. material; 1 sampling grid per month (including QA/QC samples)
shipping and handling (per year)	Costs associated with transporting samples from site to laboratory twice per month

## TABLE 7-3 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

#### **SOURCE AREA 4**

ALTERNATIVE SCS-4C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION (YEAR 0 - 6 MONTHS) / GRANULAR ACTIVATED CARBON (6 MONTHS - YEAR 30)

COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	General	\$3,000
	Soil Vapor Extraction (with emission controls)	\$206,000
	Catalytic Oxidation System	\$134,00
	Granular Activated Carbon	\$24,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$367,000
	Bid Contingency (10%)	\$37,000
	Scope Contingency (10%)	\$37,000
	Engineering and Design (15%)	\$55,000
	Oversight/Health and Safety (5%)	\$18,000
	TOTAL CAPITAL COSTS	\$514,000
	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Boot Treetment Sampling	\$18,000 \$22,000 \$58,000 \$120,600
	Post Treatment Sampling  TOTAL ANNUAL COSTS	\$32,000 \$250,600
REPLACEMENT CO	STS	
	None	\$0
	TOTAL REPLACEMENT COSTS (2)	\$0
PRESENT WORTH	ANALYSIS	
	Total Capital Costs (from above) (3)	\$514,000
	Present Worth Annual O&M Costs (4)	\$2,359,000
	Present Worth Replacement Costs	\$(
	TOTAL PRESENT WORTH	\$2,873,000

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years.

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4

ALTERNATIVE SCS-4C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION (YEAR 0 - 6 MONTHS) / GRANULAR ACTIVATED CARBON (6 MONTHS - YEAR 30)

DETAILED COST ESTIMATE

					Construction		Start-up &
					Installation	Annual O&M	Baseline
COST COMPONENT	Unit	No. Units	Unit Cost		Costs	Costs	Costs
हिराहान्। १५				33,000	· @ :	310.300	. D
construction trailer (rental and delivery)	yr	1	\$3,300			\$3,300	
mobilization	ls.	1	\$1,000	\$1,000			
demobilization	18	1	\$1,000	\$1,000			
decon facilities	<b>86</b> .	1	\$1,000	\$1,000			
health and safety equipment	yr	1	\$9,000			\$9,000	
electrical power service supply	yr	1	\$3,600			\$3,600	
water supply	yr	1	\$2,400			\$2,400	
State Billy testicine and in the states personal				oBi.le	27530	Tip21	: 2
SVE well installation	64.	3	\$6,000		\$18,000		
SVE mein system	la,	1	\$14,000	\$14,000	\$5,000	\$10,000	
SVE control panels	la.	1	\$3,000	\$3,000	\$1,000	\$500	
5" carbon steel piping	t	210	\$57	\$11,970			
4° carbon steel piping	ħ	110	\$32	\$3,520			
excevation for piping placement	Ř	320	\$0.67		\$214		
electrical power requirements (10 HP)	yr.	1	\$10,000			\$10,000	•
SVE treatment building	84	800	\$180	\$144,000	included		
air/water seperator tenk	lş.	1	\$5,000	\$5,000		\$1,000	
BERTHAMPINE BURNETHER BURNET BURNET BURNET BURNET				31833976	÷:	H3.00	30
Catalytic Oxidation Unit	la	1	\$134,000	\$134,000	included	\$10,000	
Natural Gas	ls.	1	\$4,000			\$4,000	
Sampling	••	8	\$5,500			\$44,000	
Controlled to the second of the spatients of the second of the second of				-323550	1	2 F. (1 A. (1 C)	20
Vapor Phase Carbon	94	2	\$12,000	\$24,000			
Regeneration	68	9.00	\$12,000	· · · · · · · · · · · · · · · · · · ·		\$108,000	
Disposel	lb.	3600	\$3			\$9,000	
Samoling	••	9.00	\$400			\$3,600	_
Setting the Control of Trag						bals.	<u> </u>
Test Kits/ Field Screening (per year)	samples	11	\$300	*	· · · · · · · · · · · · · · · · · · ·	\$3,300	
Laboratory Analysis (VOCs, N. P) (per year)	samples	131	\$200			\$26,200	•
shipping and handling (per year)	shipmt	24	\$100			\$2,400	

<sup>(1)</sup> All Post Treatment Sampling costs are presented in costs per number of samples and shipments required per year - costs are presented as annual O&M costs

#### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4 ALTERNATIVE SCS-4C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION (YEAR 0 - 6 MONTHS) / GRANULAR ACTIVATED CARBON (6 MONTHS - YEAR 30) DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
(7.4°) (2.6°)	
construction trailer (rental and delivery)	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
mobilization	Heavy equipment and trailers, per vendor estimate
dernobilization	Allowance for trailer and equipment demobilization
decon facilities	Based on level of personal and vehicle decontamination anticipated for this alternative
health and safety equipment	Allowance based on CDM equipment rates
المدواج فيداء الودومة الماسان والمواهد	
SVE well installation	Cost associated with installation of SVE wells. Based on CDM experience.
	Vendor: includes blower, exp motor, inline air filter, sãencers, dilution valve, moisture separator,
	condensate transfer pump, high condens. level alarm, vac. relief valve, vac. gauges, skid mnting,
SVE main system	interconnecting piping and a menual motor start switch
SVE control panels	Vendor estimate - NEEP (May 1998)
6" carbon steel pipe	Based on CDM experience
4" carbon steel pipe	Based on CDM experience
excevation for piping placement (5 foot depth)	12" wide trench and beckfill, 36" deep as per 1996 Means
electrical power service supply	Based on expected electrical costs per month for this alternative
water supply	Based on expected use per month for this alternative (e.g., decon, personnel use)
electrical power requirements (10 HP)	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
SVE treatment building	Basic prefabricated building on concrete pad. Based on CDM experience.
air/water separator tank	Based on CDM experience
cetalytic oxidizer/thermal treatment	Based on vendor estimates
<ul> <li>Figure Forest expenses of the contract of the con</li></ul>	
Catalytic Oxidation Unit	Vendor estimate - Global Technologies, Inc. (May 2000)
Natural Gas	Vendor estimate - Global Technologies, Inc. (May 2000)
Sampling	Based on CDM experience
Carry Serger Serger	
Vapor Phase Carbon	Vendor estimate - Carbtrol (May 2000)
•	Vendor estimate - Carbtrol (May 2000)
•	Vendor estimate - Carbtrol (May 2000)
Sampling	Vendor estimate - Carbtrol (May 2000)
the section of the se	
	Based on CDM experience and average test kit costs - ~25 samples per test kit; samples
Test Kits/ Field Screening (per year)	collected on a grid of 1 sample/250 cy contam. mat1; 1 sampling grid per 2 weeks
	Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of 1
Leboratory Analysis (VOCs, N, P) (per year)	sample/250cy contam. material; 1 sampling grid per month (including QA/QC samples)
shipping and handling (per year)	Coats associated with transporting samples from site to laboratory twice per month

## TABLE 7-3 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

#### **SOURCE AREA 4**

ALTERNATIVE SCS-4C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION (YEAR 0 - YEAR 1) / GRANULAR ACTIVATED CARBON (YEAR 1- YEAR 30)

COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	General	\$3,000
	Soil Vapor Extraction (with emission controls)	\$206,000
	Catalytic Oxidation System	\$134,000
	Granular Activated Carbon	\$24,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$367,000
	Bid Contingency (10%)	\$37,000
	Scope Contingency (10%)	\$37,000
	Engineering and Design (15%)	\$55,000
	Oversight/Health and Safety (5%)	\$18,000
	TOTAL CAPITAL COSTS	\$514,000
ANNUAL OPERAT	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance	\$22,000 \$61,000
ANNUAL OPERAT	General Regular System Maintenance/Electrical	\$18,000 \$22,000 \$61,000 \$120,600 \$32,000
REPLACEMENT C	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Post Treatment Sampling TOTAL ANNUAL COSTS	\$22,000 \$61,000 \$120,600 \$32,000
	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Post Treatment Sampling TOTAL ANNUAL COSTS	\$22,000 \$61,000 \$120,600 \$32,000
	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Post Treatment Sampling TOTAL ANNUAL COSTS OSTS	\$22,000 \$61,000 \$120,600 \$32,000 \$253,600
REPLACEMENT C	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Post Treatment Sampling  TOTAL ANNUAL COSTS  None  TOTAL REPLACEMENT COSTS (2)	\$22,000 \$61,000 \$120,600 \$32,000 \$253,600
REPLACEMENT C	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Post Treatment Sampling  TOTAL ANNUAL COSTS  OSTS  None  TOTAL REPLACEMENT COSTS (2)	\$22,000 \$61,000 \$120,600 \$32,000 \$253,600
REPLACEMENT C	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Post Treatment Sampling  TOTAL ANNUAL COSTS  None  TOTAL REPLACEMENT COSTS (2)	\$22,000 \$61,000 \$120,600 \$32,000 \$253,600 \$0 \$0
	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Post Treatment Sampling  TOTAL ANNUAL COSTS  OSTS  None  TOTAL REPLACEMENT COSTS (2)  I ANALYSIS  Total Capital Costs (from above) (3)	\$22,000 \$61,000 \$120,600 \$32,000 \$253,600

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years.

## SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4 ALTERNATIVE SCS-4C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION (YEAR 0 - YEAR 1) / GRANULAR ACTIVATED CARBON (YEAR 1- YEAR 30) DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
POPULATION OF THE POPULATION O			<b>X</b> .	13300	<b>3</b>	518,300	:20
construction trailer (rental and delivery)	yr	1	\$3,300			\$3,300	
mobilization	ls.	1	\$1,000	\$1,000			_
demobilization	ls	1	\$1,000	\$1,000			
decon facilities	04.	1	\$1,000	\$1,000			
health and safety equipment	ут	1	\$9,000			\$9,000	
electrical power service supply	уr	1	\$3,600			\$3,600	
water supply	yr	1	\$2,400			\$2,400	
Parky of a sector of the body of				3176,17	22000	Mill	5.
SVE well installation	<b>00</b> .	3	\$6,000		\$18,000		
SVE main system	ls	1	\$14,000	\$14,000	\$5,000	\$10,000	
SVE control panels	ls	1	\$3,000	\$3,000	\$1,000	\$500	
6" carbon steel piping	ft	210	\$57	\$11,970		1	
4" carbon steel piping	ft	110	\$32	\$3,520			
excevation for piping placement	R	320	\$0.67		\$214		
electrical power requirements (10 HP)	yr.	1	\$10,000			\$10,000	
SVE treatment building	sf	800	\$180	\$144,000	included		
air/weter separator tank	is	1	\$5,000	\$5,000		\$1,000	
Congress Commission of the Congress of the Con				BEAR	70	1315.00	30
Catalytic Oxidation Unit	is	1	\$134,000	\$134,000	included	\$10,000	•
Natural Gas	ls	1	\$7,000			\$7,000	
Sampling	96	8	\$5,500			\$44,000	
ty you take the state of the st				225.25	4,	\$r10,175	1
Vapor Phase Carbon	60	2	\$12,000	\$24,000			
Regeneration	ib	9.00	\$12,000			\$108,000	
Disposal	lb	3600	\$3			\$9,000	
Sampling	••	9.00	\$400			\$3,600	
Victoria de la companya del companya de la companya del companya de la companya d					<u>.</u>	257.3	1
Test Kits/ Field Screening (per year)	samples	11	\$300			\$3,300	
Laboratory Analysis (VOCs, N, P) (per year)	samples	131	\$200			\$26,200	
shipping and handling (per year)	shipmt	24	\$100			\$2,400	

<sup>(1)</sup> All Post Treatment Sampling costs are presented in costs per number of samples and shipments required per year - costs are presented as annual O&M costs

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4 ALTERNATIVE SCS-4C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION (YEAR 0 - YEAR 1) / GRANULAR ACTIVATED CARBON (YEAR 1- YEAR 30)

#### **DETAILED COST ESTIMATE - COMMENTS**

COST COMPONENT	COMMENTS
<b>C</b> CCCT	
	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
mobilization	Heavy equipment and trailers, per vendor estimate
demobilization	Allowance for trailer and equipment demobilization
decon facilities	Based on level of personal and vehicle decontamination anticipated for this atternative
health and safety equipment	Allowance based on CDM equipment rates
Stern V proposa de recente pera	
SVE well installation	Cost associated with installation of SVE wells. Based on CDM experience.
	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator,
1	condensate transfer pump, high condens, level alarm, vac. relief valve, vac. gauges, skid mnting,
SVE main system	interconnecting piping and a manual motor start switch
SVE control penels	Vendor estimate - NEEP (May 1998)
6" carbon steel pipe	based on CDM experience
4" carbon steel pipe	based on CDM experience
excevation for piping placement (5 foot depth)	12" wide trench and backfill, 36" deep as per 1996 Means
electrical power service supply	Based on expected electrical costs per month for this alternative
water supply	Based on expected use per month for this alternative (e.g., decon, personnel use)
electrical power requirements (10 HP)	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
SVE treatment building	Basic prefabricated building on concrete pad. Based on CDM experience.
air/water separator tank	Based on CDM experience
Control of the state of the sta	
Cetalytic Oxidation Unit	Vendor estimate - Global Technologies, Inc (May 2000)
Natural Gas	Vendor estimate - Global Technologies, Inc (May 2000)
Sampling	Based on CDM experience
(He work of Andrews of Magnetic persons on the con-	
Vapor Phase Carbon	Vendor estimate - Carbtrol (May 2000)
Regeneration	Vendor estimate - Carbtrol (May 2000)
Disposel	Vendor estimate - Carbtrol (May 2000)
Sampling	Vendor estimate - Carbtrol (May 2000)
1974 - Carlo Garlon, et al estado	
	Based on CDM experience and average test kit costs - ~25 samples per test kit; samples
Test Kits/ Field Screening (per year)	collected on a grid of 1 sample/250 cy contam. mat1; 1 sampling grid per 2 weeks
Į.	Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of 1
Laboratory Analysis (VOCs, N, P) (per year)	sample/250cy contam. material; 1 sampling grid per month (including QA/QC samples)
shipping and handling (per year)	Costs associated with transporting samples from site to laboratory twice per month

## TABLE 7-3 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

### SOURCE AREA 4 ALTERNATIVE SCS-4C: SOIL VAPOR EXTRACTION (SVE) / GRANULAR ACTIVATED CARBON COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	General	\$3,000
	Soil Vapor Extraction (with emission controls)	\$206,000
	Granular Activated Carbon	\$24,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$233,000
	Bid Contingency (10%)	\$23,000
	Scope Contingency (10%)	\$23,000
	Engineering and Design (15%)	\$35,000
•	Oversight/Health and Safety (5%)	\$12,000
	TOTAL CAPITAL COSTS	\$326,000
ANNUAL OPERA	TING AND MAINTENANCE COSTS	
	General	\$15,000
	General Regular System Maintenance/Electrical	\$15,000 \$22,000
	Regular System Maintenance/Electrical Granular Activated Carbon Maintenance (Year 0- Year 1)	\$22,000 \$3,516,800
	Regular System Maintenance/Electrical Granular Activated Carbon Maintenance (Year 0- Year 1) Granular Activated Carbon Maintenance (Year 1- Year 30)	\$22,000 \$3,516,800 \$120,600
	Regular System Maintenance/Electrical Granular Activated Carbon Maintenance (Year 0- Year 1)	\$22,000 \$3,516,800
	Regular System Maintenance/Electrical Granular Activated Carbon Maintenance (Year 0- Year 1) Granular Activated Carbon Maintenance (Year 1- Year 30)	\$22,000 \$3,516,800 \$120,600
REPLACEMENT (	Regular System Maintenance/Electrical Granular Activated Carbon Maintenance (Year 0- Year 1) Granular Activated Carbon Maintenance (Year 1- Year 30) Post Treatment Sampling TOTAL ANNUAL COSTS	\$22,000 \$3,516,800 \$120,600 \$32,000
REPLACEMENT (	Regular System Maintenance/Electrical Granular Activated Carbon Maintenance (Year 0- Year 1) Granular Activated Carbon Maintenance (Year 1- Year 30) Post Treatment Sampling TOTAL ANNUAL COSTS	\$22,000 \$3,516,800 \$120,600 \$32,000
REPLACEMENT	Regular System Maintenance/Electrical Granular Activated Carbon Maintenance (Year 0- Year 1) Granular Activated Carbon Maintenance (Year 1- Year 30) Post Treatment Sampling  TOTAL ANNUAL COSTS	\$22,000 \$3,516,800 \$120,600 \$32,000 \$3,706,400
	Regular System Maintenance/Electrical Granular Activated Carbon Maintenance (Year 0- Year 1) Granular Activated Carbon Maintenance (Year 1- Year 30) Post Treatment Sampling  TOTAL ANNUAL COSTS  None  TOTAL REPLACEMENT COSTS (2)	\$22,000 \$3,516,800 \$120,600 \$32,000 \$3,706,400
·	Regular System Maintenance/Electrical Granular Activated Carbon Maintenance (Year 0- Year 1) Granular Activated Carbon Maintenance (Year 1- Year 30) Post Treatment Sampling  TOTAL ANNUAL COSTS  None  TOTAL REPLACEMENT COSTS (2)	\$22,000 \$3,516,800 \$120,600 \$32,000 \$3,706,400 \$0
	Regular System Maintenance/Electrical Granular Activated Carbon Maintenance (Year 0- Year 1) Granular Activated Carbon Maintenance (Year 1- Year 30) Post Treatment Sampling  TOTAL ANNUAL COSTS  None  TOTAL REPLACEMENT COSTS (2)  H ANALYSIS  Total Capital Costs (from above) (3)	\$22,000 \$3,516,800 \$120,600 \$32,000 \$3,706,400 \$0 \$0
REPLACEMENT (	Regular System Maintenance/Electrical Granular Activated Carbon Maintenance (Year 0- Year 1) Granular Activated Carbon Maintenance (Year 1- Year 30) Post Treatment Sampling  TOTAL ANNUAL COSTS  None  TOTAL REPLACEMENT COSTS (2)	\$22,000 \$3,516,800 \$120,600 \$32,000 \$3,706,400 \$0

- (1) Capital costs for construction items do not include oversight fees, which are accounted for separately.
- (2) Replacement costs include construction and oversight capital costs.
- (3) Capital costs represent the present worth of the given alternative.
- (4) Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years.

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4 ALTERNATIVE SCS-4C: SOIL VAPOR EXTRACTION (SVE) / GRANULAR ACTIVATED CARBON DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M	Start-up & Baseline Costa
Zu Tre	Oim		Unit COST	3,000		315,000	
construction trailer (rental and delivery)	yτ	1	\$3,300				4.0-6.
mobilization	ls.	1	\$1,000	\$1,000			-
demobilization	is	1	\$1,000	\$1,000			
decon fecilities	98.	1	\$1,000	\$1,000			-
health and safety equipment	уг	1	\$9,000			\$9,000	
electrical power service supply	yr	1	\$3,600			\$3,600	
water supply	yr	1	\$2,400			\$2,400	
Burgara and red a payar				BUREL	275.25.	333,603	3:
SVE well installation	<b>00.</b>	3	\$6,000		\$18,000		
SVE main system	ls	1	\$14,000	\$14,000	\$5,000	\$10,000	
SVE control panels	la	1	\$3,000	\$3,000	\$1,000	\$500	
6° carbon steel piping	ft	210	\$57	\$11,970			
4" carbon steel piping	ft	110	\$32	\$3,520			
excavation for piping placement	R	320	\$0.67		\$214		
electrical power requirements (10 HP)	yr.	1	\$10,000			\$10,000	
SVE treatment building	s/	800	\$180	\$144,000	included		
sir/water separator tank	is	1	\$5,000	\$5,000		\$1,000	
a rathering the equil of the experience of the control of				\$73 h		. 230.00	
Vapor Phase Carbon	•4	2	\$12,000	\$24,000			
First Year Vapor Phase Carbon Regeneration	04	157.00	\$12,000			\$1,884,000	
First Year Vapor Phase Carbon Disposal	Ь	628000	<b>\$</b> 3			\$1,570,000	
First Year Vapor Phase Carbon Sampling	44	157.00	\$400			\$62,800	
promption record in the tracking of the contraction					<u> </u>	> tile til	
Regeneration	96	9.00	\$12,000			\$108,000	
Disposel	lb	3600	<b>\$</b> 3			\$9,000	
Sampling	00	9.00	\$400			\$3,600	
Test Kits/ Field Screening (per year)	samples	11	\$300			\$3,300	
Leboratory Analysis (VOCs, N, P) (par year)	samples	131	\$200			\$26,200	
shipping and handling (per year)	shipmt	24	\$100			\$2,400	

<sup>(1)</sup> All Post Treatment Sampling costs are presented in costs per number of samples and shipments required per year - costs are presented as annual O&M costs

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4 ALTERNATIVE SCS-4C: SOIL VAPOR EXTRACTION (SVE) / GRANULAR ACTIVATED CARBON DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
Control of the second of the s	
construction trailer (rental and delivery)	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
mobilization	Heavy equipment and trailers, per vendor estimate
demobilization	Allowance for trailer and equipment demobilization
decon facilities	Based on level of personal and vehicle decontamination anticipated for this alternative
health and safety equipment	Allowance based on CDM equipment rates
Control of the Control of the State of the S	
SVE well installation	Cost associated with installation of SVE wells. Based on CDM experience.
	Vendor: includes blower, exp motor, inline air filter, säencers, däution valve, moisture separator,
	condensate transfer pump, high condens. level alarm, vac. relief valve, vac. gauges, skid mriting,
SVE main system	interconnecting piping and a manual motor start switch
SVE control panels	Vendor estimate - NEEP (May 1998)
6" carbon steel pipe	based on CDM experience
4" carbon steel pipe	based on CDM experience
excavation for piping placement (5 foot depth)	12" wide trench and backfill, 36" deep as per 1996 Means
electrical power service supply	Based on expected electrical costs per month for this alternative
weter supply	Based on expected use per month for this alternative (e.g., decon, personnel use)
electrical power requirements (10 HP)	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
SVE treatment building	Basic prefabricated building on concrete pad. Based on CDM experience.
sir/water seperator tank	Based on CDM experience
catalytic oxidizer/thermal treatment	Based on vendor estimates
Commence of the second second second second second	
•	Vendor estimate - Carbtrol (May 2000)
	Vendor estimate - Carbtrol (May 2000)
	Vendor estimate - Carbtrol (May 2000)
	Vendor estimate - Carbtrol (May 2000)
Egg and Southerfall atternation and a site of	
•	Vendor estimate - Carbtrol (May 2000)
·	Vendor estimate - Carbtrol (May 2000)
	Vendor estimate - Carbtrol (May 2000)
The set to see a second section of	
	Based on CDM experience and average test kit costs - ~25 samples per test kit; samples collected
Test Kits/ Field Screening (per year)	on a grid of 1 sample/250 cy contam. mat1; 1 sampling grid per 2 weeks
	Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of 1
	sample/250cy contam. material; 1 sampling grid per month (including QA/QC samples)
shipping and handling (per year)	Costs associated with transporting samples from site to laboratory twice per month

#### APPENDIX D.2

# DETAILED COST BACKUP CATALYTIC OXIDATION VS. GRANULAR ACTIVATED CARBON ALTERNATIVE SCS-7E

## TABLE 7-9 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FOCUSED FEASIBILITY STUDY

#### **SOURCE AREA 7**

ALTERNATIVE SCS-7E: SOIL VAPOR EXTRACTION (SVE)/AIR SPARGING (AS) ALONG SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS / CATALYTIC OXIDATION COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	Groundwater Use Restrictions	\$25,000
	General	\$167,000
	Leachate Monitoring Wells	\$120,000
	VRS/Catalytic Oxidation System	\$976,000
	Air Sparging	\$694,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$1,982,000
	Bid Contingency (15%)	\$297,000
	Scope Contingency (20%)	\$396,000
	Engineering and Design (15%)	\$297,000
	Oversight/Health and Safety (5%)	\$99,000
	TOTAL CAPITAL COSTS	\$3,071,000
ANNUAL OPERATIN	IG AND MAINTENANCE COSTS	
	General	\$24,000
	VRS Regular Maintenance/Electrical	\$63,000
	Leachate Sampling and Analysis (per event)	\$28,000
	Catalytic Oxidation Maintenance	\$109,000
	Regular System Maintenance/Electrical	\$96,000
	TOTAL ANNUAL COSTS	\$320,000
REPLACEMENT CO	STS	
REFLACEMENT CO		
REFERCEMENT CO	Leachate Monitoring Wells (every 15 years)	\$29,000
REFLACEMENTOO	Equipment Replacement (e.g., motors, blowers) -	
REPEAGEMENT CO		\$29,000 \$30,000
REPLACEMENT CO	Equipment Replacement (e.g., motors, blowers) -	
	Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$30,000
	Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$30,000
	Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$30,000 \$59,000 \$3,071,000
	Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4) Leachate Sampling	\$30,000 \$59,000 \$3,071,000
	Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4) Leachate Sampling Quarterly Sampling - years 1 and 2	\$30,000 \$59,000 \$3,071,000 \$2,051,000
PRESENT WORTH	Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4) Leachate Sampling Quarterly Sampling - years 1 and 2 Semi-annual Sampling - years 3 through 10	\$30,000 \$59,000 \$3,071,000 \$2,051,000 \$207,000
	Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4) Leachate Sampling Quarterly Sampling - years 1 and 2	\$30,000 \$59,000

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% discount rate over 10 years.

<sup>(5)</sup> Present worth of replacement costs is based on a 7% annual discount rate and no replacement of leachate monitoring wells and system equipment.

## SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 7 ALTERNATIVE SCL-7E: SOIL VAPOR EXTRACTION (SVEYAIR SPARGING (AS) ALONG GMZ BOUNDARY AND SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS / CATALYTIC OXIDATION DETAILED COST ESTIMATE

COOT COMPONENT	Hall	No Hote	11-14-0	Combal Com	Construction/ installation	Annual O&M	Start-up & Baseline
COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Costs	Costs	Costs
iogal foce	la	1	\$25,000	\$25,000	·		
State of		•	020,000	10752	1.000	25,800	3.00.0
construction trailer (rental and delivery)	mo	3	\$275	\$825	1150 (13)		- A- (4 ) A-7
mobilization	is	1	\$1,000	\$1,000		·	
demobilization	18	1	\$1,000	\$1,000		<del>                                     </del>	
decon facilities	04	1	\$1,000	\$1,000			
health and safety equipment	mo	3	\$2,000	\$6,000		\$24,000	
electrical power service connection	is.	1	\$5,000	\$5,000		i	
electrical power service supply	mo	3	\$400	\$1,200			
weter supply [	mo	3	\$200	\$600			
Plint Scale Study	is .	1	\$150,000	\$60,000	\$40,000		\$50,000
14 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -							
Leachale - monitoring well installation and materials	well	5	\$6,000		\$30,000		
Performance Monitoring well installation and materials	well	15	\$6,000		\$90,000		
ersand later types	No.	10	000	:	· · ·	244	7
labor	hours	40	\$60			\$2,400	
vehicle	day	2	\$60			\$120	
equipment	<u>la</u>	1	\$600			\$600	
miscellaneous	le .	1	\$1,000			\$500	
Leachale laboratory analysis	each	20	\$230			\$4,600 \$20,000	
quarterly reports	each	4	\$5,000	e Central			19350
VRS well installation	64.	16	\$6,000	1 - 2 - 3 - 3 - 3 - 3	\$96,000	523 (4)	73,777
VRS main system	ls.	2	\$50,000	\$100,000	\$20,000	\$20,000	\$25,000
VRS control penels	ls.	2	\$10,000	\$20,000	\$1,000	\$4,000	420,000
6" cerbon steel piping	ft	3000	\$57	\$171,000	<b>V.,555</b>	\$5,000	
4° carbon steel piging	n	500	\$32	\$16,000		\$3,200	
excevation for piging placement	R	3500	\$4.41		\$15,435		
electrical power requirements (10 HP)	yr.	1	\$20,000			\$20,000	
VRS treatment building	sf sf	1200	\$180	\$216,000	included		
airAvator separator tank	is .	2	\$10,000	\$20,000		\$4,000	
einwater separator tank - condensate disposal	gai	260	\$25			\$6,500	
- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1							
Catalytic Oxidation Unit	le	1	\$276,000	\$276,000	included	\$10,000	
Netural Gos	le	1	\$43,800			\$43,800	
Catalyst Replacement	- 64	3	\$38,400			\$11,520	
Sampling	**	8	\$5,500			\$44,000	
No. 2022 per a see A. S.				المستام فيات	27.5.1	ر لافعاد	بالإرسائلا
AS well installation		57	\$6,000		\$342,000	<u></u>	
AS main system	<u>ls</u>	1	\$100,000	\$100,000	\$20,000	\$20,000	\$25,000
AS control panels	ls.	1 2000	\$3,000	\$3,000	\$1,500	\$600	
6" carbon steel piping	<u> </u>	3000	\$57	\$171,000		\$34,200	
4° carbon aleal piping	<u> </u>	500	\$32	\$16,000	945 495	\$3,200	
excevation for piping placement	II .	3500	\$4.41		\$15,435	\$12.000	
condensate disposal	Q <del>al</del>	520	\$25			\$13,000	
electrical power requirements (25 HP)	year	1	\$25,000			\$25,000	
AS treatment building						<del>                                     </del>	
air/water separator lank				th corresponding VR d with corresponding			

COST COMPONENT	COMMENTS
mar and the state of the state	
legal fees	Cost based on CDM experience
C	
	50'x12' construction trailer - \$1.65/ml delivery fee (100ml) - rental allowance per 1996 Means
	Heavy equipment and trailers, per vendor estimate
	Allowance for trailer and equipment demobilization
	Based on level of personal and vehicle decontamination anticipated for this alternative
	Allowance based on CDM equipment rates
electrical power service connection	
•	Based on expected electrical costs per month for this alternative
	Based on expected use per month for this elfernative (e.g., decon, personnel use)
The description	person at expected use per triorier for any amountaine (e.g., escal, personner use)
	Cost based on CDM experience in monitoring well installation
•	Cost based on CDM experience in monitoring well installation
Parameter money was made and the made as	COSK DESCRIPTION OF THE PROPERTY OF THE PROPER
	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
	Based on \$300/week rental fee for a field vehicle
	Based on CDM equipment rental rates
miscellaneous	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
1	Based on average cost incurred for VOC analysis; One duplicate and one blank will be collected per 10
leachate laboratory analysis	samples.
the executive of the contract of the second	
VRS well installation	Cost associated with installation of SVE wells. Based on CDM experience.
	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator, condensate
	transfer pump, high condens. level alarm, vac. relief valve, vac. gauges, skid mounting, interconnecting piping
VRS mein system	and a manual motor start switch
VRS control panels	Vendor estimate - NEEP (May 1998)
•	Based on CDM experience
	Based on CDM experience
	12" wide trench and backfill, 48" deep as per 2000 Means
	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
<u> </u>	Basic prefabricated building on concrete pad. Based on CDM experience.
•	Based on CDM experience
air/water seperator tank - condensate disposal	Based on CDM experience
Some proceedings of the	
	Vendor estimate - Global Technologies, Inc (May 2000)
	Vendor estimate - Global Technologies, Inc (May 2000)
* *	Vendor estimate - Global Technologies, Inc (May 2000)
<u> </u>	Based on CDM experience
Specifically h	
AS well installation	Cost associated with installation of AS wells. Based on CDM experience.
AS main system	Vendor: includes blower, exp motor, inline silencer, pressure relief valve, unitized base, pressure gauge and
	a menual motor starting switch.
· ·	Vendor estimate
	Based on CDM experience
	Based on CDM experience
	12" wide trench and backfill, 48" deep as per 2000 Means
•	Based on CDM experience
	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
	Costs for AS treatment building included with corresponding VRS
	Costs for air/water separator tank included with corresponding VRS
cetalytic oxidation treatment	Costs for catalytic oxidation treatment included with corresponding VRS

Page 3 of 3

# TABLE 7-9 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FOCUSED FEASIBILITY STUDY

#### **SOURCE AREA 7**

ALTERNATIVE SCS-7E: SOIL VAPOR EXTRACTION (SVE)/AIR SPARGING (AS) ALONG SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS / CATALYTIC OXIDATION (YEAR 0 - 6 MONTHS) / GRANULAR ACTIVATED CARBON (6 MONTHS - YEAR 10)

COST SUMMARY

_	Item/Description	Total Cost
CAPITAL COSTS		
	Groundwater Use Restrictions	\$25,00
	General	\$167,00
	Leachate Monitoring Wells	\$120,00
	VRS/Catalytic Oxidation System	\$976,00
	Granular Activated Carbon	\$24,00
	Air Sparging	\$694,00
	SUBTOTAL CONSTRUCTION COSTS (1)	\$2,006,00
	Rid Continuous (1594)	<b>\$</b> 204.00
	Bid Contingency (15%)	\$301,00
	Scope Contingency (20%) Engineering and Design (15%)	\$401,00 \$301,00
	Oversight/Health and Safety (5%)	\$100,00
	Oversign/Present and Selecty (5%)	\$100,00
	TOTAL CAPITAL COSTS	\$3,109,00
NNUAL OPERA	TING AND MAINTENANCE COSTS	<u>-</u>
	General	\$24,00
	VRS Regular Maintenance/Electrical	\$63,00
	Leachate Sampling and Analysis (per event)	\$28,00
	Catalytic Oxidation System Maintenance	\$76,00
	Granular Activated Carbon Maintenance	\$399,00
	Regular System Maintenance/Electrical	\$96,00
	TOTAL ANNUAL COSTS	\$686,00
REPLACEMENT (	COSTS	
REPLACEMENT (	Leachate Monitoring Wells (every 15 years)	\$29,00
REPLACEMENT (	Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) -	
REPLACEMENT (	Leachate Monitoring Wells (every 15 years)	\$29,00 \$30,00
REPLACEMENT (	Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) -	\$30,00
	Leachate Monitoring Wells (every 15 years)  Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$30,00
	Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$30,00 \$59,00
	Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  H ANALYSIS  Total Capital Costs (from above) (3)	\$30,00 \$59,00 \$3,109,00
	Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$30,00 \$59,00
	Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  H ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4)	\$30,00 \$59,00 \$3,109,00
PRESENT WORT	Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  H ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4) Leachate Sampling	\$30,00 \$59,00 \$3,109,00 \$3,929,000.0
	Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  H ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4) Leachate Sampling Quarterly Sampling - years 1 and 2	\$30,00 \$59,00 \$3,109,00 \$3,929,000.0 \$207,00

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% discount rate over 10 years.

<sup>(5)</sup> Present worth of replacement costs is based on a 7% annual discount rate and no replacement of leachate monitoring wells and system equipment.

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 7
ALTERNATIVE SCS-7E: SOIL VAPOR EXTRACTION (SVEYAIR SPARGING (AS) ALONG SOURCE AREA / MONITORING / GROUNDWATER USE
RESTRICTIONS / CATALYTIC OXIDATION (YEAR 0 - 6 MONTHS) / GRANULAR ACTIVATED CARBON (6 MONTHS - YEAR 10) DETAILED COST ESTIMATE

					Construction/ Installation	Annual O&M	Start-up & Baseline
COST COMPONENT	<u>Unit</u>	No. Units	Unit Cost	Capital Cost	Costs	Costs	Costs
Bring which the market is 18, 4, 1			رخ.	257760			<b>3</b> 4 %
logal foor	<u>le</u>	1	\$25,000	\$25,000	11: 4:		
(entry)			0075	77772	23400	· · · · · · · · · · · · · · · · · · ·	<u></u>
construction trailer (rental and delivery)	mo is	1	\$275	\$825 \$1,000		<del>                                     </del>	
mobilization demobilization	18	1	\$1,000 \$1,000	\$1,000	· · · · · · · · · · · · · · · · · · ·	<del></del>	
decon facilities		1	\$1,000	\$1,000		<b>—</b> —	<del>-</del>
health and safety equipment	mo	3	\$2,000	\$6,000		\$24,000	
electrical power service connection	is.	1 - 1 -	\$5,000	\$5,000		424,000	
electrical power service supply	mo	3	\$400	\$1,200		<del> </del>	
weter supply	mo	3	\$200	\$600			
Pilot Scale Study	la	1	\$150,000	\$60,000	\$40,000		\$50,000
The environment of					4 P. L. R. C. C.	30	
Leachate - monitoring well installation and materials	well	5	\$6,000		\$30,000		
Performance Monitoring well installation and materials	well	15	\$8,000		\$90,000		
The Miller of the Control of the Control	* *						
to the stay in section							
iebor	hours	40	\$60			\$2,400	
vehicle	day	2	\$60			\$120	
equipment	le le	1	\$600			\$600	
miscellaneaus	ls	1	\$1,000			\$500	
Leechale laboratory analysis	each	20	\$230			\$4,600	
quarterly reports	each	4	\$5,000			\$20,000	_
Minder #10,4400 ndess 230 in extreme				densit .	atratic	107 020	7,000,00
VRS well installation	86.	16	\$6,000		\$96,000	1	
VRS main system	ls .	2	\$50,000	\$100,000 \$20,000	\$20,000 \$1,000	\$20,000 \$4,000	\$25,000
VRS control penels	n n	3000	\$10,000 \$57	\$171,000	\$1,000	\$5,000	
6" cerbon steel piping 4" cerbon steel piping	R	500	\$32	\$16,000		\$3,200	
4" carson avear piping excavation for piping placement	n n	3500	\$4.41	\$16,000	\$15,435	\$3,200	
electrical power requirements (10 HP)	yr.	1	\$20,000		<b>\$13,433</b>	\$20,000	
VRS treatment building		1200	\$180	\$216,000	included	\$20,000	
air/water separator tank	<u></u>	2	\$10,000	\$20,000		\$4,000	
air/water separator tank - condensate (Saposal	gai	260	\$25	<u> </u>		\$6,500	
the company of the filter of the company of the com			424	233-1-1		14.	:
Catalytic Oxidation Unit	16	1	\$278,000	\$276,000	included	\$10,000	
Metural Gas	ls	1	\$21,900			\$21,900	
Sampling	04	8	\$5,500			\$44,000	
C. C. C. C. C. C. C. C. C. C. C. C. C. C				300.2			
Vapor Phase Carbon	æ	2	\$12,000	\$24,000			
Regeneration	lb.	22.00	\$12,000			\$264,000	
Disposal	lb	50600	\$3			\$126,500	
Sampling	64	22.00	\$400			\$8,800	
UM and Special CONS			****	1.64.7.48.25	1971		21700
AS well installation		57	\$6,000	********	\$342,000	*20.000	e25 000
AS main system	<u> </u>	1	\$100,000	\$100,000 \$3,000	\$20,000 \$1,500	\$20,000 \$600	\$25,000
AS control penals	<u>ls</u> If	3000	\$3,000 \$57	\$171,000	000,16	\$800 \$34,200	
6" cerbon ateel piping 4" cerbon ateel piping	<u> </u>	500	\$32	\$16,000		\$3,200	
excevetion for piping pleasment	<del></del>	3500	\$4.41	\$10,000	\$15,435	<del>\$3,200</del>	
excuveron for piping preceivers condensate disposal	gel	520	\$25	<del>                                     </del>	410,400	\$13,000	
electrical power requirements (25 HP)	year	1	\$25,000	<del></del>		\$25,000	
AS treatment building		resiment builde		corresponding VRS	<del> </del>	122,000	
airivater seperator tenk			<u> </u>		3	<del>                                     </del>	
cutalytic oxidation treatment							

ALTERNATIVE SCS-7E: SOIL VAPOR EXTRACTION (SVE)/AIR SPARGING (AS) ALONG SOURCE AREA / MONITORING / GROUNDWATER USE
RESTRICTIONS / CATALYTIC OXIDATION (YEAR 0 - 6 MONTHS) / GRANULAR ACTIVATED CARBON (6 MONTHS - YEAR 10)
DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
् विकासिक मुख्या के सुरक्ष के सम्मान के स्वाहत के सम्मान के सम्मान के सम्मान के सम्मान के सम्मान के सम्मान के सम्मान के सम्मान के	
· legal fees	Cost based on CDM experience
construction trailer (rental and delivery)	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
	Heavy equipment and trailers, per vendor estimate
	Allowance for trailer and equipment demobilization
	Based on level of personal and vehicle decontamination anticipated for this alternative
	Allowance based on CDM equipment rates
	Based on CDM experience
•	Based on expected electrical costs per month for this alternative
	Based on expected use per month for this alternative (e.g., decon, personnel use)
10000000	and the state of t
	Cost based on CDM experience in monitoring well installation
	Cost based on CDM experience in monitoring well installation
and the second s	The state of the s
No No.	
	Record on 40 hours week day of the groupe CDM to be not of 600 for groups.
	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
	Based on \$300/week rental fee for a field vehicle
	Based on CDM equipment rental rates
miscellaneous	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
l	Based on average cost incurred for VOC analysis; One duplicate and one blank will be collected
leachate laboratory analysis	per 10 samples.
Manager fill ments accomply on an extent	
VRS well installation	Cost associated with installation of SVE wells. Based on CDM experience.
	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator,
	condensate transfer pump, high condens. level alarm, vac. relief valve, vac. gauges, skid mnting,
-	interconnecting piping and a manual motor start switch
VRS control panels	Vendor estimate - NEEP (May 1998)
6" carbon steel pipe	Based on CDM experience
	Based on CDM experience
	12" wide trench and backfill, 48" deep as per 2000 Means
electrical power requirements (10 HP)	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
VRS treatment building	Basic prefabricated building on concrete pad. Based on CDM experience.
ainwater separator tank	Based on CDM experience
ainwater separator tank - condensate disposal	Based on CDM experience
catalytic oxidation	Based on CDM experience
	Based on CDM experience
( or the figure of the end of the end of the control of the contro	
Catalytic Oxidelion Unit	Vendor estimate - Global Technologies, Inc (May 2000)
	Vendor estimate - Global Technologies, Inc (May 2000)
	Based on CDM experience
Confession for American the Englander proposition of the	
``` <u> </u>	Vendor estimate - Carbtrol (May 2000)
	Vendor estimate - Carbtrol (May 2000)
	Vendor estimate - Carbtrol (May 2000)
-	Vendor estimate - Carbtrol (May 2000)
hospe pile of the	
·	Cost associated with installation of AS wells. Based on CDM experience.
rio wan matematori	Vendor: includes blower, exp motor, inline silencer, pressure relief valve, unitized base, pressure
AS main system	gauge and a manual motor starting switch.
dense Indone 2A	Vendor estimate
•	Based on CDM experience
	Based on CDM experience
	12" wide trench and backfill, 48" deep as per 2000 Means
	Based on CDM experience
	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
	Costs for AS treatment building included with corresponding VRS
air/water separator tank	Costs for air/water separator tank included with corresponding VRS Costs for catalytic oxidation treatment included with corresponding VRS

# TABLE 7-9 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FOCUSED FEASIBILITY STUDY

#### **SOURCE AREA 7**

ALTERNATIVE SCS-7E: SOIL VAPOR EXTRACTION (SVE)/AIR SPARGING (AS) ALONG SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS / CATALYTIC OXIDATION (YEAR 0-YEAR 1) / GRANULAR ACTIVATED CARBON (YEAR 1-YEAR 10)

COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	Groundwater Use Restrictions	\$25,000
	General	\$167,00
	Leachate Monitoring Wells	\$120,000
	VRS/Catalytic Oxidation System	\$976,000
	Granular Activated Carbon	\$24,00
	Air Sparging	\$694,00
	SUBTOTAL CONSTRUCTION COSTS [1]	\$2,006,00
	Bid Contingency (15%)	\$301,000
	Scope Contingency (20%)	\$401,000
	Engineering and Design (15%)	\$301,000
	Oversight/Health and Safety (5%)	\$100,000
	TOTAL CAPITAL COSTS	\$3,109,000
	0	\$24,00
		₹24 AA
	General VPS Popular Maintenance (Floatrice)	
	VRS Regular Maintenance/Electrical	\$63,000
	VRS Regular Maintenance/Electrical Leachate Sampling and Analysis (per event)	\$63,000 \$28,000
	VRS Regular Maintenance/Electrical Leachate Sampling and Analysis (per event) Catalytic Oxidation System Maintenance	\$63,000 \$28,000 \$98,000
	VRS Regular Maintenance/Electrical Leachate Sampling and Analysis (per event)	\$63,000 \$28,000 \$98,000 \$399,000
	VRS Regular Maintenance/Electrical Leachate Sampling and Analysis (per event) Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance	\$63,000 \$28,000 \$98,000 \$399,000 \$96,000
REPLACEMENT C	VRS Regular Maintenance/Electrical Leachate Sampling and Analysis (per event) Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Regular System Maintenance/Electrical TOTAL ANNUAL COSTS	\$63,000 \$28,000 \$98,000 \$399,000 \$96,000
REPLACEMENT CO	VRS Regular Maintenance/Electrical Leachate Sampling and Analysis (per event) Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  DSTS  Leachate Monitoring Wells (every 15 years)	\$63,000 \$28,000 \$98,000 \$399,000 \$96,000
REPLACEMENT C	VRS Regular Maintenance/Electrical Leachate Sampling and Analysis (per event) Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Regular System Maintenance/Electrical TOTAL ANNUAL COSTS	\$63,000 \$28,000 \$98,000 \$399,000 \$96,000 \$708,000 \$30,000
REPLACEMENT C	VRS Regular Maintenance/Electrical Leachate Sampling and Analysis (per event) Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) -	\$63,000 \$28,000 \$98,000 \$399,000 \$96,000 \$708,000
REPLACEMENT CO	VRS Regular Maintenance/Electrical Leachate Sampling and Analysis (per event) Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$63,000 \$28,000 \$98,000 \$399,000 \$708,000 \$708,000 \$29,000
	VRS Regular Maintenance/Electrical Leachate Sampling and Analysis (per event) Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$63,000 \$28,000 \$98,000 \$399,000 \$708,000 \$708,000 \$29,000
	VRS Regular Maintenance/Electrical Leachate Sampling and Analysis (per event) Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (A)  ANALYSIS	\$63,000 \$28,000 \$98,000 \$399,000 \$96,000 \$708,000 \$30,000 \$59,000
	VRS Regular Maintenance/Electrical Leachate Sampling and Analysis (per event) Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  DISTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS  ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4)	\$63,000 \$28,000 \$399,000 \$399,000 \$708,000 \$708,000 \$30,000 \$3,109,000 \$3,806,000.00
	VRS Regular Maintenance/Electrical Leachate Sampling and Analysis (per event) Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  DISTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS  ANALYSIS  Total Capital Costs (from above) (1) Present Worth Annual O&M Costs (4) Leachate Sampling	\$63,000 \$28,000 \$399,000 \$399,000 \$708,000 \$708,000 \$30,000 \$3,109,000 \$3,806,000,00
	VRS Regular Maintenance/Electrical Leachate Sampling and Analysis (per event) Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  DISTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS  ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4) Leachate Sampling Quarterly Sampling - years 1 and 2	\$63,000 \$28,000 \$98,000 \$399,000 \$708,000 \$708,000 \$30,000 \$59,000

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

1

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% discount rate over 10 years.

<sup>(5)</sup> Present worth of replacement costs is based on a 7% annual discount rate and no replacement of leachate monitoring wells and system equipment.

ALTERNATIVE SCS-7E: SOIL VAPOR EXTRACTION (SVE)/AIR SPARGING (AS) ALONG SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS / CATALYTIC OXIDATION (YEAR 0- YEAR 1) / GRANULAR ACTIVATED CARBON (YEAR 1- YEAR 10) DETAILED COST ESTIMATE

					Construction/ Installation	Annual O&M	Start-up & Baseline
COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Coets	Costs	Costs
(in the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second o	10	1	*25.000	225,000	•	2:	20
	is	, ,	\$25,000	\$25,000			31.53
construction trailer (rental and delivery)	mo	3	\$275	\$825	there	2 3 7 6 6 7	. <u>Dig</u>
mobilization	is	1	\$1,000	\$1,000			
demobilization	18	1 1	\$1,000	\$1,000	<del></del>		
decon facilities	00	1	\$1,000	\$1,000		<del></del>	
health and safety equipment	mo	3	\$2,000	\$6,000		\$24,000	
electrical power service connection	ls	1	\$5,000	\$5,000		32 (12)	
electrical power service supply	mo	3	\$400	\$1,200			
weter supply	mo	3	\$200	\$600			
Plot Scale Study	<b>10</b>	1	\$150,000	\$60,000	\$40,000		\$50,000
A Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of the Commence of							2)
Leachale - monitoring wall installation and materials	well	5	\$6,000		\$30,000		
Performance Monitoring well installation and materials	well	15	\$6,000		\$90,000		
<ul> <li>A property of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second</li></ul>							
The Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Co	ho	40	\$60	<u> </u>		\$2,400	*
labor vehicle	hours day	2	\$60	<del></del>		\$2,400	
equipment	is	1	\$600	<del>                                     </del>	-	\$600	
miscolleneous	19	<del>                                     </del>	\$1,000			\$500	
Leechale laboratory analysis	each	20	\$230	<del></del>		\$4,600	
quarterly reports	each	4	\$5,000			\$20,000	
1775 - 178 FOR 177 177 177 1	-		40,000	34:3:00	50.00	27700	553000
VRS well installation	00.	16	\$6,000		\$96,000		12.2.71.22
VRS main system	ls	2	\$50,000	\$100,000	\$20,000	\$20,000	\$25,000
VRS control penels	ls	2	\$10,000	\$20,000	\$1,000	\$4,000	
6" cerbon steel piping	R	3000	\$57	\$171,000	_	\$5,000	
€" cerbon steel piping	ñ	500	\$32	\$16,000		\$3,200	
excevation for piping placement	R	3500	\$4.41		\$15,435		
electrical power requirements (10 HP)	yr.	1	\$20,000			\$20,000	
VRS treatment building	sf	1200	\$180	\$216,000	included		
air/water separator tank	B	2	\$10,000	\$20,000		\$4,000	
air/weter separator tank - condensate disposal	gel	260	\$25			\$6,500	
	4-		0070 000	\$276,000	in about and	610,000	,
Catalytic Oxidation Unit	is.	1	\$276,000	\$276,000	included	\$10,000	<del></del> -
Network Gas	10	1 8	\$43,800 \$5,500	<del></del>	<del></del>	\$43,800 \$44,000	
Sampling:	00		40,300	يرا فيدو في و		\$44,000	.20
Vapor Phase Carbon	0.0	2	\$12,000	\$24,000	· -	4 4 7 1,11,41	. A
Regeneration	- <del></del>	22.00	\$12,000	427,555		\$264,000	
Disposal	lb	50600	\$3	<del></del>		\$126,500	
Semplina	00	22.00	\$400			\$8,800	
The group of the se				196244	والإيراء و		z YLANGO
AS well installation	00	57	\$6,000		\$342,000		
AS main system	is	1	\$100,000	\$100,000	\$20,000	\$20,000	\$25,000
AS control penels	18	1	\$3,000	\$3,000	\$1,500	\$600	
6" cerbon ateel piping	¥	3000	\$57	\$171,000		\$34,200	
4" cerbon steel piping	¥	500	\$32	\$16,000		\$3,200	
excevellan for piping placement	¥	3500	\$4.41		\$15,435		
condensate disposal	gal	520	\$25	T		\$13,000	
electrical power requirements (25 HP)	year	1	\$25,000			\$25,000	
AS treatment building						I	
air/water separator tenk							
cetalytic axidation treatment	Costs for catal	yec oxidation tre	etment include	d with corresponding	VRS		

ALTERNATIVE SCS-7E: SOIL VAPOR EXTRACTION (SVE)/AIR SPARGING (AS) ALONG SOURCE AREA / MONITORING / GROUNDWATER USE
RESTRICTIONS / CATALYTIC OXIDATION (YEAR 0- YEAR 1) / GRANULAR ACTIVATED CARBON (YEAR 1- YEAR 10)
DETAILED COST ESTIMATE - COMMENTS

\$7.47.43	Cost based on CDM experience
\$7.47.43	Cost based on CDM experience
	COST DESCRIPTION EXPERIENCE
construction trailer (motal and deliment	
COMBUCEON DESIGN (FORES MIN CONTON)	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
mobilization	Heavy equipment and trailers, per vendor estimate
demobilization	Allowance for trailer and equipment demobilization
<b>.</b>	Based on level of personal and vehicle decontamination anticipated for this alternative
<b>.</b>	Allowance based on CDM equipment rates
electrical power service connection	
	Based on expected electrical costs per month for this alternative
	Based on expected use per month for this alternative (e.g., decon, personnel use)
	Cost based on CDM experience in monitoring well installation
	Cost based on CDM experience in monitoring well installation
ng gaffing kanala sa tanàn sa kaominina mpikambana ao amin'ny fivondronan-departmentanta. Ny INSEE dia mampiasa mpikambana amin'ny faritr'o amin'ny faritr'o amin'ny faritr'o ao amin'ny faritr'o amin'n	
	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
	Based on \$300/week rental fee for a field vehicle
F	Based on CDM equipment rental rates
	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
	Based on average cost incurred for VOC analysis; One duplicate and one blank will be collected
leachate laboratory analysis	per 10 samples.
40 th teach of 28% of its 1142420	One to a secretary life in a secretary of ONE and a COMMAN AND AND AND AND AND AND AND AND AND A
F	Cost associated with installation of SVE wells. Based on CDM experience.
	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator,
,	condensate transfer pump, high condens. level alarm, vac. relief valve, vac. gauges, skid mnting, interconnecting piping and a manual motor start switch
· · · · · · · · · · · · · · · · · · ·	Vendor estimate - NEEP (May 1998)
· }	Based on CDM experience
· · · · · · · · · · · · · · · · · · ·	Based on CDM experience
	12" wide trench and backfill, 48" deep as per 2000 Means
	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
<b>_</b>	Basic prefabricated building on concrete pad. Based on CDM experience.
- I	Based on CDM experience
eir/water separator tank - condensate disposal	Based on CDM experience
Nysten Opinie internesy grand EV ( ) by V ( )	
Catalytic Oxidation Unit	Vendor estimate - Global Technologies, Inc (May 2000)
	Vendor estimate - Global Technologies, Inc (May 2000)
<u> </u>	Based on CDM experience
PART OF THE ROY OF THE BEST FOR THE PART OF THE SECTION	
· · · · · · · · · · · · · · · · · · ·	Vendor estimate - Carbtrol (May 2000)
	Vendor estimate - Carbtrol (May 2000)
· L	Vendor estimate - Carbtrol (May 2000)
	Vendor estimate - Carbtrol (May 2000)
AS well installation	Cost associated with installation of AS wells. Based on CDM experience.
	Vendor: includes blower, exp motor, inline silencer, pressure relief valve, unitized base, pressure
	gauge and a manual motor starting switch.
	Vendor estimate
	Based on CDM experience
	Based on CDM experience
	12" wide trench and backfill, 48" deep as per 2000 Means
	Based on CDM experience
•	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
	Costs for AS treatment building included with corresponding VRS
air/water separator tank	Costs for air/water separator tank included with corresponding VRS
catalytic oxidation treatment	Costs for catalytic oxidation treatment included with corresponding VRS

# TABLE 7-9 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FOCUSED FEASIBILITY STUDY

#### **SOURCE AREA 7**

ALTERNATIVE SCS-7E: SOIL VAPOR EXTRACTION (SVE)/AIR SPARGING (AS) ALONG SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS / GRANULAR ACTIVATED CARBON COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	Groundwater Use Restrictions	\$25,00
	General	\$167,00
	Leachate Monitoring Wells	\$120,00
	Granular Activated Carbon	\$24,00
	VRS	\$700,00
	Air Sparging	\$694,00
	SUBTOTAL CONSTRUCTION COSTS (1)	\$1,730,00
	Bid Contingency (15%)	\$260,00
	Scope Contingency (20%)	\$346,00
	Engineering and Design (15%)	\$260,00
	Oversight/Health and Safety (5%)	\$87,00
	TOTAL CAPITAL COSTS	\$2,683,000
	General	\$24.00
	General	\$24,00
	VRS Regular Maintenance/Electrical	\$63,00
	<b>~</b> .	
	Leachate Sampling and Analysis (per event)	\$28,000
	Leachate Sampling and Analysis (per event) Granular Activated Carbon Maintenance (Year 0-Year1)	\$28,000 \$2,214,300
	Leachate Sampling and Analysis (per event)	\$28,00 \$2,214,30 \$399,00
	Leachate Sampling and Analysis (per event) Granular Activated Carbon Maintenance (Year 0-Year1) Granular Activated Carbon Maintenance (Year 1-Year10	\$28,000 \$2,214,300 \$399,000 \$96,000
REPLACEMENT CO	Leachate Sampling and Analysis (per event) Granular Activated Carbon Maintenance (Year 0-Year1) Granular Activated Carbon Maintenance (Year 1-Year10 Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS	\$28,000 \$2,214,300 \$399,000 \$96,000
REPLACEMENT CO	Leachate Sampling and Analysis (per event) Granular Activated Carbon Maintenance (Year 0-Year1) Granular Activated Carbon Maintenance (Year 1-Year10 Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS	\$28,000 \$2,214,300 \$399,000 \$96,000 \$2,824,300
REPLACEMENT CO	Leachate Sampling and Analysis (per event) Granular Activated Carbon Maintenance (Year 0-Year1) Granular Activated Carbon Maintenance (Year 1-Year10) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  DISTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) -	\$28,000 \$2,214,300 \$399,000 \$96,000 \$2,824,300 / \$29,000
REPLACEMENT CO	Leachate Sampling and Analysis (per event) Granular Activated Carbon Maintenance (Year 0-Year1) Granular Activated Carbon Maintenance (Year 1-Year10) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  DISTS  Leachate Monitoring Wells (every 15 years)	\$28,000 \$2,214,300 \$399,000 \$96,000 \$2,824,300
REPLACEMENT CO	Leachate Sampling and Analysis (per event) Granular Activated Carbon Maintenance (Year 0-Year1) Granular Activated Carbon Maintenance (Year 1-Year10) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  DISTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) -	\$28,000 \$2,214,300 \$399,000 \$98,000 \$2,824,300 / \$29,000 \$30,000
REPLACEMENT CO	Leachate Sampling and Analysis (per event) Granular Activated Carbon Maintenance (Year 0-Year1) Granular Activated Carbon Maintenance (Year 1-Year10) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  Description  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$28,000 \$2,214,300 \$399,000 \$98,000 \$2,824,300 / \$29,000 \$30,000
	Leachate Sampling and Analysis (per event) Granular Activated Carbon Maintenance (Year 0-Year1) Granular Activated Carbon Maintenance (Year 1-Year10) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  STS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)	\$28,000 \$2,214,300 \$399,000 \$96,000 \$2,824,300 \$29,000 \$30,000
	Leachate Sampling and Analysis (per event) Granular Activated Carbon Maintenance (Year 0-Year1) Granular Activated Carbon Maintenance (Year 1-Year10) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  STS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  ANALYSIS  Total Capital Costs (from above) (3)	\$28,000 \$2,214,300 \$399,000 \$98,000 \$2,824,300 \$30,000 \$59,000 \$2,683,000
	Leachate Sampling and Analysis (per event) Granular Activated Carbon Maintenance (Year 0-Year1) Granular Activated Carbon Maintenance (Year 1-Year10) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  DISTS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4)	\$28,000 \$2,214,300 \$399,000 \$98,000 \$2,824,300 \$30,000 \$59,000 \$2,683,000
	Leachate Sampling and Analysis (per event) Granular Activated Carbon Maintenance (Year 0-Year1) Granular Activated Carbon Maintenance (Year 1-Year10) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  STS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4) Leachate Sampling	\$28,000 \$2,214,300 \$399,000 \$96,000 \$2,824,300 \$30,000 \$59,000 \$5,928,300.00
	Leachate Sampling and Analysis (per event) Granular Activated Carbon Maintenance (Year 0-Year1) Granular Activated Carbon Maintenance (Year 1-Year10) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  STS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4) Leachate Sampling Quarterly Sampling - years 1 and 2	\$28,00 \$2,214,30 \$399,00 \$96,00 \$2,824,30 / \$29,00 \$30,00 \$5,928,300.0 \$5,928,300.0
	Leachate Sampling and Analysis (per event) Granular Activated Carbon Maintenance (Year 0-Year1) Granular Activated Carbon Maintenance (Year 1-Year10) Regular System Maintenance/Electrical  TOTAL ANNUAL COSTS  STS  Leachate Monitoring Wells (every 15 years) Equipment Replacement (e.g., motors, blowers) - every 15 years  TOTAL REPLACEMENT COSTS (2)  ANALYSIS  Total Capital Costs (from above) (3) Present Worth Annual O&M Costs (4) Leachate Sampling	\$28,000 \$2,214,300 \$399,000 \$98,000 \$2,824,300 \$30,000 \$59,000

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% discount rate over 10 years.

<sup>(5)</sup> Present worth of replacement costs is based on a 7% annual discount rate and no replacement of leachate monitoring wells and system equipment.

# SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 7 ALTERNATIVE SCS-7E: SOIL VAPOR EXTRACTION (SVEYAIR SPARGING (AS) ALONG SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS / GRANULAR ACTIVATED CARBON DETAILED COST ESTIMATE

				1	Construction		Start-up
				ł	Installation		Baseline
COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Costs	Annual O&M Costs	Costs
المناء بالمحادثي والمطاب والمطاب والمحادث والمحادث والمجاد				<u> 1950</u> (17)		7.5	1
legal feet	ls.	1	\$25,000	\$25,000			
et to 12				773 T	259.00	49 a Mar	5.70 (0)
construction trailer (rental and delivery)	mo	3	\$275	\$825			
mobilization	ls	1	\$1,000	\$1,000		1	
demobilization	18	1	\$1,000	\$1,000			
decon facilities	**	1	\$1,000	\$1,000			
health and safety equipment	mo	3	\$2,000	\$6,000		\$24,000	
electrical power service connection	is	1	\$5,000	\$5,000		1	
electrical power service supply	mo	3	\$400	\$1,200			
water supply	mo	3	\$200	\$600		1	
Plot Scale Study	ls	1	\$150,000	\$60,000	\$40,000	1	\$50,000
No. No. 12 Pr					3.0		
Leachale - monitoring well installation and materials	well	5	\$6,000	1	\$30,000	1	
Performance Monitoring well installation and materials	well	15	\$8,000	<del>                                     </del>	\$90,000		
		<u>_</u> _					
						71.40	
labor	hours	40	\$60	i i		\$2,400	
vehicle	day	2	\$80	<del>  </del>		\$120	
equipment	18	- <del>-</del> -	\$600	<del></del>		\$600	
miscollansous	is.	1	\$1,000	h		\$500	
Leachate laboratory analysis	each	20	\$230		<del></del>	\$4,600	
quarterly reports	each	4	\$5,000	<del> </del>		\$20,000	
to the office of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the	- CEUI		\$5,000	17.544	11:43	\$20,000	5. 4 T
VRS well installation	60.	16	\$6,000	2000	\$96,000	· · · · · · · · · · · · · · · · · · ·	
VRS main system	la la	2	\$50,000	\$100,000	\$20,000	\$20,000	\$25,000
VRS control penels	la la	2	\$10,000	\$20,000	\$1,000	\$4,000	\$25,000
6" cerbon ateal piping	R	3000	\$57	\$171,000	\$1,000	\$5,000	
		500	\$32	\$16,000		\$3,200	
4° cerbon steel piping excevetion for piping placement	R	3500	\$4.41	\$10,000	\$15,435	\$3,200	
		1	\$20,000		\$15,435	\$20,000	
electrical power requirements (10 HP)	yr. #	1200	\$180	\$216,000	included	\$20,000	
VRS treatment building	ls.		\$10,000	\$20,000	#ICUGEU	\$4,000	
air/water separator tenk	-	280	\$10,000	\$20,000		\$6,500	
elr/water separator tank - condensate disposal	gal	200	\$23			*******	
the state of the spirit of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the		2	649.000	\$24,000		See at to Mills	
Vepor Phase Cerbon	66		\$12,000	\$24,000		94 494 999	
First Year Vepor Phase Carbon Regeneration	9	122.00	\$12,000	<del> </del>		\$1,484,000	
First Year Vapor Phase Carbon Disposal	ab_	290800	\$3	<del></del>		\$701,500	
First Year Vapor Phase Carbon Sampling	•	122.00	\$400			\$48,800	
Control of the American State (April 1994)		00.00	240.000			6364.000	
Regeneration	<u>b</u>	22.00	\$12,000	<del> </del>		\$264,000	
Disposel	lb	50800	\$3	<del> </del>		\$126,500	
Sampling	00	22.00	\$400	20.53		\$8,800	
Market Ten Completes		p=	20 000	330,000,00	- 11, 131 ·	. 355,860	一般的
AS well installation	68	57	\$6,000	2400 000	\$342,000		805.60
AS main system	ls .	1	\$100,000	\$100,000	\$20,000	\$20,000	\$25,000
AS control penete	is_	1	\$3,000	\$3,000	\$1,500	\$600	
6" cerbon atest piping	If	3000	\$57	\$171,000		\$34,200	
4" certon alsoi piping	H	500	\$32	\$16,000	242.425	\$3,200	
excevation for piping placement	H	3500	\$4.41	L	\$15,435	L	
condensale disposal	gel	520	\$25			\$13,000	
electrical power requirements (25 HP)	yeer	1	\$25,000		<u></u>	\$25,000	
electrical power requirements (25 HP)						L	
alrivater separator tank	Costs for sirke	ater separator (	enk included with	corresponding VRB			
catalytic oxidation treatment	Costs for catel	ytic exidation to	patrment included	with corresponding V	R8	il	

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### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 7 ALTERNATIVE SCS-7E: SOIL VAPOR EXTRACTION (SVE)/AIR SPARGING (AS) ALONG SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS / GRANULAR ACTIVATED CARBON

**DETAILED COST ESTIMATE - COMMENTS** 

COST COMPONENT	COMMENTS
្រាស់ ខ្លាំង ស្រែក នៅ មានក្រុង ដែលមាន	
	Cost based on CDM experience
ry Children	
	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
	Heavy equipment and trailers, per vendor estimate
	Allowance for trailer and equipment demobilization
	Based on level of personal and vehicle decontamination anticipated for this alternative
	Allowance based on CDM equipment rates
	Based on CDM experience
	Based on expected electrical costs per month for this alternative
	Based on expected use per month for this alternative (e.g., decon, personnel use)
Note that the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the se	
	Cost based on CDM experience in monitoring well installation
Performance monitoring well installation and materials	Cost based on CDM experience in monitoring well installation
1 CONTRACTOR	
labor	Based on 10 hour work day at the average CDM labor rate of \$60 for oversite personnel
	Based on \$300/week rental fee for a field vehicle
	Based on CDM equipment rental rates
· · ·	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
//ISCAMB/INDUS	Based on average cost incurred for VOC analysis; One duplicate and one blank will be collected
ieachate laboratory analysis	
When a title and a sharp of the parties	per to samples.
	Control of the last of CONTROL Control of CONTROL CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTR
VRS well installellon	
	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator,
	condensate transfer pump, high condens. level alarm, vac. relief valve, vac. gauges, skid mnting,
	interconnecting piping and a manual motor start switch
•	Vendor estimate - NEEP (May 1998)
	Based on CDM experience
	Based on CDM experience
excevation for piping placement (4 foot depth)	12" wide trench and backfill, 48" deep as per 2000 Means
electrical power requirements (10 HP)	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
VRS treatment building	Basic prefabricated building on concrete pad. Based on CDM experience.
eir/water separator tank	Based on CDM experience
ainwater seperator tank - condenzate disposal	Based on CDM experience
Control of the Secretary Control of the Secretary	
Vapor Phase Carbon	Vendor estimate - Carbtrol (May 2000)
First Year Vapor Phase Carbon Regeneration	Vendor estimate - Carbtrol (May 2000)
	Vendor estimate - Carbtrol (May 2000)
	Vendor estimate - Carbtrol (May 2000)
the appeal of the expension of the period of the first of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of	
	Vendor estimate - Carbtrol (May 2000)
· · · · · · · · · · · · · · · · · · ·	Vendor estimate - Carbtrol (May 2000)
•	Vendor estimate - Carbtrol (May 2000)
Like also against a basis	
	Cost associated with installation of AS wells. Based on CDM experience.
NO NON PLANSAGE	Vendor: includes blower, exp motor, inline silencer, pressure relief valve, unitized base, pressure
AS main system	
	gauge and a manual motor starting switch.
•	Vendor estimate
	Based on CDM experience
	Based on CDM experience
	12" wide trench and backfill, 48" deep as per 2000 Means
	Based on CDM experience
	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
	Costs for AS treatment building included with corresponding VRS
ainwater separator tank	Costs for air/water separator tank included with corresponding VRS
· · · · · · · · · · · · · · · · · · ·	Costs for catalytic oxidation treatment included with corresponding VRS

### APPENDIX D.3

# DETAILED COST BACKUP CATALYTIC OXIDATION VS. GRANULAR ACTIVATED CARBON ALTERNATIVE SCS-11C

# TABLE 7-15 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

### SOURCE AREA 11 ALTERNATIVE SCS-11C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS	<b>3</b>	
	General	\$3,000
	Soil Vapor Extraction (with emission controls)	\$242,000
	Catalytic Oxidation System	\$143,500
	SUBTOTAL CONSTRUCTION COSTS (1)	\$388,500
	Bid Contingency (10%)	\$39,000
	Scope Contingency (10%)	\$39,000
	Engineering and Design (15%)	\$58,000
	Oversight/Health and Safety (5%)	\$19,000
	TOTAL CAPITAL COSTS	\$543,500
ANNUAL OPERA	ITING AND MAINTENANCE COSTS	
ANNUAL OPERA	General	\$18,000
ANNUAL OPERA		\$18,000 \$36,000
ANNUAL OPERA	General	
ANNUAL OPERA	General Regular System Maintenance/Electrical	\$36,000
annual opera	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance	\$36,000 \$68,880
	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Post Treatment Sampling TOTAL ANNUAL COSTS	\$36,000 \$68,880 \$90,000
REPLACEMENT	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Post Treatment Sampling TOTAL ANNUAL COSTS	\$36,000 \$68,880 \$90,000 \$212,880
	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Post Treatment Sampling  TOTAL ANNUAL COSTS  COSTS  TOTAL REPLACEMENT COSTS (2)	\$36,000 \$68,880 \$90,000
REPLACEMENT	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Post Treatment Sampling  TOTAL ANNUAL COSTS  COSTS  TOTAL REPLACEMENT COSTS (2)	\$36,000 \$68,880 \$90,000 \$212,880
REPLACEMENT	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Post Treatment Sampling  TOTAL ANNUAL COSTS  COSTS  TOTAL REPLACEMENT COSTS (2)  TH ANALYSIS  Total Capital Costs (from above) (3)	\$36,000 \$68,880 \$90,000 \$212,880 \$543,500
REPLACEMENT	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Post Treatment Sampling  TOTAL ANNUAL COSTS  COSTS  TOTAL REPLACEMENT COSTS (2)	\$36,000 \$68,880 \$90,000 \$212,880

- (1) Capital costs for construction items do not include oversight fees, which are accounted for separately.
- (2) Replacement costs include construction and oversight capital costs.
- (3) Capital costs represent the present worth of the given alternative.
- (4) Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years.

Note: SVE present worth costs are based on 30 year operation.

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### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 11 ALTERNATIVE SCS-11C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION DETAILED COST ESTIMATE

					Construction/		Start-up 8
					installation	Annual O&M	Baseline
COST COMPONENT	Unit No. Units Unit Cost Capital Cos		Capital Cost	Costs Costs		Costs	
tartes x x x x x				_ 38000	🤌	SEED :	12.
construction trailer (rental and delivery)	yr	1	\$3,300			\$3,300	
mobilization	ls	1	\$1,000	\$1,000			
demobilization .	18	1	\$1,000	\$1,000		I	_
decon facilities	68	1	\$1,000	\$1,000			
health and safety equipment	yr	1	\$9,000			\$9,000	
electrical power service supply	yr	1	\$3,600			\$3,600	
water supply	yr	1	\$2,400			\$2,400	
englig getelekaben son son son bestele				Vilks	386,000	\$ (4,10)	
SVE well installation	88	5	\$6,000		\$30,000	Ĭ	
SVE main system	unit	1	\$18,000	\$18,000	\$6,000	\$10,000	
SVE control penels	unit	1	\$3,000	\$3,000	\$1,500	\$500	-
6" carbon steel piping	ft	535	\$57	\$30,495			
4° cerbon steel piping	ft	100	\$32	\$3,200			
excavation for piping placement	ft	635	\$0.67		\$425		
electrical power requirements (25 HP)	ls	1	\$25,000			\$25,000	
SVE treatment building	sf	800	\$180	\$144,000	included		
eir/water separator tank	ls	1	\$5,000	\$5,000		\$500	-
المراجعة المخور المراجعة المخمورة المخورة				3 (3-2)		11.0	.20
Cetalytic Oxidation Unit	is	1	\$143,500	\$143,500	included	\$10,000	
Natural Gas	ls	1	\$12,000			\$12,000	
Catalyst Replacement	68	9	\$9,600			\$2,880	
Sampling	68	8	\$5,500			\$44,000	
and the second second second second				21.		De 35	<i>;</i> i,
Test Kits/ Field Screening (per year)	samples	33	\$300			\$9,900	
Laboratory Analysis (VOCs, N, P) (per year)	samples	390	\$200			\$78,000	
shipping and handling (per year)	shipmt	24	\$100			\$2,400	

<sup>(1)</sup> All Post Treatment Sampling costs are presented in costs per number of samples and shipments required per year - costs are presented as annual O&M costs

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 11 ALTERNATIVE SCS-11C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
Chiral	
	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
	Heavy equipment and trailers, per vendor estimate
demobilization	Allowance for trailer and equipment demobilization
decon facilities	Based on level of personal and vehicle decontamination anticipated for this alternative
health and safety equipment	Allowance based on CDM equipment rates
electrical power service supply	Based on expected electrical costs per month for this alternative
water supply	Based on expected use per month for this alternative (e.g., decon, personnel use)
Spinifriger and records to ya	
SVE well installation	Cost associated with installation of SVE wells. Based on CDM experience.
	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator,
SVE main system	condensate transfer pump, high condens, level alarm, vac. relief valve, vac. gauges, skid mnting,
•	interconnecting piping and a manual motor start switch
SVE control penels	Vendor estimate - NEEP (May 1998)
6" carbon steel piping	based on CDM experience
4" certion steel piping	based on CDM experience
excevation for piping placement	12" wide trench and backfill, 36" deep as per 1996 Means
electrical power requirements (40 HP)	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
SVE treatment building	Basic prefabricated building on concrete pad. Based on CDM experience.
air/water separator tank	Based on CDM experience
catalytic oxidizar/thermal treatment	Based on vendor estimates
( A Style of Palet into a Style of	
Catalytic Oxidation Unit	Vendor estimate - Global Technologies, Inc. (May 2000)
Natural Gas	Vendor estimate - Global Technologies, Inc. (May 2000)
Catalyst Replacement	Vendor estimate - Global Technologies, Inc. (May 2000)
Sampling	Based on CDM experience
Der Ser Frei dige Sie Keit Soudhare	·
	Based on CDM experience and average test kit costs - ~25 samples per test kit; samples
Test Kits/ Field Screening (per year)	collected on a grid of 1 sample/250 cy contam. mat'l; 1 sampling grid per 2 weeks
	Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of 1
	sample/250cy contam. material; 1 sampling grid per month (including QA/QC samples)
shipping and handling (per year)	Costs associated with transporting samples from site to laboratory twice per month

# TABLE 7-15 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

#### **SOURCE AREA 11**

ALTERNATIVE SCS-11C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION (YEAR 0 - 6 MONTHS) / GRANULAR ACTIVATED CARBON (6 MONTHS - YEAR 30)

COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS	<b>;</b>	
	General	\$3,000
	Soil Vapor Extraction (with emission controls)	\$242,000
	Catalytic Oxidation System	\$143,500
	Granular Activated Carbon	\$24,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$412,500
	Bid Contingency (10%)	\$41,000
	Scope Contingency (10%)	\$41,000
	Engineering and Design (15%)	\$62,000
	Oversight/Health and Safety (5%)	\$21,000
	TOTAL CAPITAL COSTS	\$577,500
ANNUAL OPERA	TING AND MAINTENANCE COSTS	
	General	\$18,000
	Regular System Maintenance/Electrical	\$36,000
	Catalytic Oxidation System Maintenance	\$60,000
	Granular Activated Carbon Maintenance	\$50,002
	Post Treatment Sampling	\$90,000
	TOTAL ANNUAL COSTS	\$254,002
REPLACEMENT	COSTS	
	TOTAL REPLACEMENT COSTS (2)	\$0
PRESENT WORT		\$0
PRESENT WORT	TH ANALYSIS	
PRESENT WORT	Th ANALYSIS  Total Capital Costs (from above) (3)	\$577,500
PRESENT WORT	TH ANALYSIS	\$577,500 \$2,412,000 \$0

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years.

## SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 11 ALTERNATIVE SCS-11C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION (YEAR 0 - 6 MONTHS) / GRANULAR ACTIVATED CARBON (6 MONTHS - YEAR 30) DETAILED COST ESTIMATE

					Construction/		Start-up &
					Installation	Annual O&M	Baseline
COST COMPONENT	Unit	No. Units	<b>Unit Cost</b>	Capital Cost	Costs	Costs	Costs
15(1.m) ★ 12 (5. <b>3</b> (4)	- 3			1 33.77		. Silkely.	$\tilde{\mathcal{M}}$
construction trailer (rental and delivery)	yr	1	\$3,300			\$3,300	
noblissifican	la	1	\$1,000	\$1,000			
notestillaceneb	18	1	\$1,000	\$1,000			
decon fecilities	84	1	\$1,000	\$1,000			
heelth and safety equipment	уr	1	\$9,000			\$9,000	
electrical power service supply	yr	1	\$3,600			\$3,600	
water supply	yr	1	\$2,400			\$2,400	
r kyropikaziji terri absty a				2012	27/12/2	2000	
SVE well installation	96	5	\$6,000		\$30,000		
SVE main system	unit	1	\$18,000	\$18,000	\$6,000	\$10,000	
SVE control panels	unit	1	\$3,000	\$3,000	\$1,500	\$500	
6° carbon steel piping	ft	535	\$57	\$30,495			
4" carbon ateal piping	π	100	\$32	\$3,200			
excevation for piping placement	ft	635	\$0.67		\$425		
electrical power requirements (25 HP)	is	1	\$25,000			\$25,000	
SVE treatment building	ᅿ	800	\$180	\$144,000	included		
ainweter separator tank	is	1	\$5,000	\$5,000		\$500	
Trypho Contrate to gradient Contrate Contrate				313300	2.5	530,000	. 🔀
Cetalytic Oxidation Unit	ls	1	\$143,500	\$143,500	included	\$10,000	
Natural Ges	is	1	\$6,000			\$6,000	
Sampling	•	8	\$5,500			\$44,000	
and the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of th			_	22500		2014207	1
Vapor Phase Carbon	64	2	\$12,000	\$24,000			
Regeneration	- 00	4.00	\$12,000			\$48,000	
Disposal	lb	160.8	\$3			\$402	
Sampling	94	4.00	\$400			\$1,600	
A Marin Constant of the							:
Test Kits/ Field Screening (per year)	samples	33	\$300		•	\$9,900	
Laboratory Analysis (VOCs, N, P) (per year)		390	\$200			\$78,000	
shipping and handling (per year)	shipmt	24	\$100			\$2,400	

<sup>(1)</sup> All Post Treatment Sampling costs are presented in costs per number of samples and shipments required per year - costs are presented as annual O&M costs

ALTERNATIVE SCS-11C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION (YEAR 0 - 6 MONTHS) / GRANULAR ACTIVATED CARBON (6 MONTHS - YEAR 30)

#### DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS						
George 1							
	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means						
mobilization	Heavy equipment and trailers, per vendor estimate						
demobilization	Allowance for trailer and equipment demobilization						
decon facilities	Based on level of personal and vehicle decontamination anticipated for this alternative						
health and safety equipment	Allowance based on CDM equipment rates						
electrical power service supply	Seeed on expected electrical costs per month for this alternative						
water supply	Based on expected use per month for this atternative (e.g., decon, personnel use)						
At the section of the section							
SVE well installation	Cost associated with installation of SVE wells. Based on CDM experience.						
	Vendor: Includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator,						
SVE main system	condensate transfer pump, high condens, level alarm, vac. relief valve, vac. gauges, skid mnting,						
	interconnecting piping and a manual motor start switch						
SVE control penets	Vendor estimate - NEEP (May 1998)						
6" cerbon steel piping	based on CDM experience						
4" cerbon steel piping	based on CDM experience						
excevation for piping placement	12" wide trench and backfill, 36" deep as per 1996 Means						
	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr						
SVE treatment building	Basic prefabricated building on concrete pad. Based on CDM experience.						
	Based on CDM experience						
cetalytic oxidizenthermal treatment	Based on vendor estimates						
to a graduate the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the							
	Vendor estimate - Global Technologies, Inc. (May 2000)						
	Vendor estimate - Global Technologies, Inc. (May 2000)						
Sampling	Based on CDM experience						
Carrier Service Company Science Company							
•	Vendor estimate - Carbirol (Mey 2000)						
	Vendor estimate - Carbtrol (May 2000)						
• •	Vendor estimate - Carbtrol (May 2000)						
	Vendor estimate - Carbirol (May 2000)						
The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s							
	Based on CDM experience and average test kit costs - ~25 samples per test kit; samples collected						
Test Kits/ Field Screening (per year)	on a grid of 1 sample/250 cy contam. mailt; 1 sampling grid per 2 weeks						
	Based on 1996 sample analysis costs from Midwest laboratories; samples collected on a grid of 1						
	sample/250cy contam. material; 1 sampling grid per month (including QA/QC samples)						
shipping and handling (per year)	Costs associated with transporting samples from site to laboratory twice per month						

# TABLE 7-15 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

#### **SOURCE AREA 11**

ALTERNATIVE SCS-11C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION (YEAR 0-YEAR 1) / GRANULAR ACTIVATED CARBON (YEAR 1-YEAR 30)

COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS	}	
	General	\$3,000
	Soil Vapor Extraction (with emission controls)	\$242,000
	Catalytic Oxidation System	\$143,500
	Granular Activated Carbon	\$24,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$412,500
	Bid Contingency (10%)	\$41,000
	Scope Contingency (10%)	\$41,000
	Engineering and Design (15%)	\$62,000
	Oversight/Health and Safety (5%)	\$21,000
	TOTAL CAPITAL COSTS	\$577,500
	General Regular System Maintenance/Electrical Catalytic Oxidation System Maintenance Granular Activated Carbon Maintenance	\$18,000 \$36,000 \$66,000 \$50,002
	Post Treatment Sampling	\$90,000
	Post Treatment Sampling TOTAL ANNUAL COSTS	
REPLACEMENT	TOTAL ANNUAL COSTS	\$90,000
REPLACEMENT (	TOTAL ANNUAL COSTS	\$90,000
	TOTAL ANNUAL COSTS  COSTS  TOTAL REPLACEMENT COSTS (2)	\$90,000 \$260,002
	TOTAL ANNUAL COSTS  COSTS  TOTAL REPLACEMENT COSTS (2)	\$90,000 \$260,002
	TOTAL ANNUAL COSTS  COSTS  TOTAL REPLACEMENT COSTS (2)  TH ANALYSIS	\$90,000 \$260,002 \$0
REPLACEMENT	TOTAL ANNUAL COSTS  TOTAL REPLACEMENT COSTS (2)  TH ANALYSIS  Total Capital Costs (from above) (3)	\$90,000 \$260,002 \$0 \$577,500

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years.

ALTERNATIVE SCS-11C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION (YEAR 0- YEAR 1) / GRANULAR ACTIVATED CARBON (
YEAR 1- YEAR 30)
DETAILED COST ESTIMATE

					Construction/		Start-up &
COST COMPONENT	11-14	Sta- Halta	11-10 04	04-104	Installation	Annual O&M	Baseline
	Unit	No. Units	Unix Cost	Capital Cost	Costs	Costs	Costs
<u> </u>			62.000	- <u>1900</u> 0		WELLS.	.37
construction trailer (rental and delivery)	yr	1 1	\$3,300			\$3,300	
mobilization	ls _	1	\$1,000	\$1,000			
demobilization	18	1	\$1,000	\$1,000-			
decon fecilities	68	1	\$1,000	\$1,000			
health and safety equipment	yr	1	\$9,000			\$9,000	
electrical power service supply	уг	11	\$3,600			\$3,600	
weder supply	yr	1	\$2,400			\$2,400	
201 BY Goran Commission -				2000	\$20,25	$\sum E_{NMN}$	<u> </u>
SVE well installed on	64	5	\$6,000		\$30,000	L	
SVE main system	unit	1	\$18,000	\$18,000	\$6,000	\$10,000	
SVE control penets	unit	1	\$3,000	\$3,000	\$1,500	\$500	
6° certion steel piping	ft	535	\$57	\$30,495			
4° carbon steel piping	ft	100	\$32	\$3,200			
excevation for piping placement	ft	635	\$0.67		\$425	-	
electrical power requirements (25 HP)	ls.	1	\$25,000			\$25,000	
SVE treatment building	sf	800	\$180	\$144,000	included		
einheder seperator tenk	ls	1	\$5,000	\$5,000		\$500	
Harry Mark & Mark Street Street Street				3734.7	13	And the second	7
Catalytic Oxidation Unit	ls	1	\$143,500	\$143,500	included	\$10,000	<del></del>
Natural Gas	is	1	\$12,000			\$12,000	
Sempling	06	8	\$5,500			\$44,000	
Companie tenga superiore est				2.5.0		State Serie	.5.
Vapor Phase Carbon	64	2	\$12,000	\$24,000			
Regeneration	lb	4.00	\$12,000			\$48,000	<del></del>
Disposai	16	160.8	\$3	-		\$402	
Sampling	08	4.00	\$400			\$1,600	
A Programme Andrews				į	:	10.10	Ĭ.
Test Kits/ Field Screening (per year)	samples	33	\$300	······	^	\$9,900	<u>A</u> -
Leboratory Analysis (VOCs, N, P) (per year)	samples	390	\$200			\$78,000	
shipping and handling (per year)	shipmt	24	\$100		-	\$2,400	

<sup>(1)</sup> All Post Treatment Sampling costs are presented in costs per number of samples and shipments required per year - costs are presented as annual O&M costs

# SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 11 ALTERNATIVE SCS-11C: SOIL VAPOR EXTRACTION (SVE) / CATALYTIC OXIDATION (YEAR 0- YEAR 1) / GRANULAR ACTIVATED CARBON ( YEAR 1- YEAR 30) DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS						
CONTRACTOR OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF	enter the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second						
construction trailer (rental and delivery)	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means						
mobilization	Heavy equipment and trailers, per vendor estimate						
demobilization	Allowance for trailer and equipment demobilization						
decon facilities	Based on level of personal and vehicle decontamination anticipated for this alternative						
health and safety equipment	Viowance based on CDM equipment rates						
electrical power service supply	Based on expected electrical costs per month for this alternative						
water supply	Based on expected use per month for this alternative (e.g., decon, personnel use)						
होता अध्याद्यास्त्र अस्ति । सुन्ति । तस्य प्रीय							
SVE well installation	Cost associated with installation of SVE wells. Based on CDM experience.						
<b>i</b>	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator,						
SVE mein system	condensate transfer pump, high condens. level alarm, vac. relief valve, vac. gauges, skid mnting,						
	interconnecting piping and a manual motor start switch						
SVE control penets	Vendor estimate - NEEP (May 1998)						
6" carbon steel piping	based on CDM experience						
4" carbon steel piping	based on CDM experience						
excevation for piping placement	12" wide trench and backfill, 36" deep as per 1996 Means						
electrical power requirements (40 HP)	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr						
•	Basic prefabricated building on concrete pad. Based on CDM experience.						
	Based on CDM experience						
catalytic oxidizer/thermal treatment	Based on vendor estimates						
But the first of the contract of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second							
· ·	Vendor estimate - Global Technologies, Inc. (May 2000)						
	Vendor estimate - Global Technologies, Inc. (May 2000)						
Sampling	Based on CDM experience						
Copyright for Dography is the first of the district of the contract of							
	Vendor estimate - Carbtrol (May 2000)						
•	Vendor estimate - Carbtrol (May 2000)						
•	Vendor estimate - Carbtrol (May 2000)						
	Vendor estimate - Carbtrol (May 2000)						
Street By Carlot Contract							
5	Based on CDM experience and average test kit costs - ~25 samples per test kit; samples						
Test Kits/ Field Screening (per year)	collected on a grid of 1 sample/250 cy contam. mat1; 1 sampling grid per 2 weeks						
1	Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of 1						
	sample/250cy contam. material; 1 sampling grid per month (including QA/QC samples)						
shipping and handling (per year)	Costs associated with transporting samples from site to laboratory twice per month						

# TABLE 7-15 SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT ROCKFORD, ILLINOIS FEASIBILITY STUDY

### SOURCE AREA 11 ALTERNATIVE SCS-11C: SOIL VAPOR EXTRACTION (SVE) / GRANULAR ACTIVATED CARBON COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS	5	
	General	\$3,000
	Soil Vapor Extraction (with emission controls)	\$242,000
	Granular Activated Carbon	\$24,000
	SUBTOTAL CONSTRUCTION COSTS (1)	\$269,000
	Bid Contingency (10%)	\$27,000
	Scope Contingency (10%)	\$27,000
	Engineering and Design (15%)	\$40,000
	Oversight/Health and Safety (5%)	\$13,000
	TOTAL CAPITAL COSTS	\$376,000
ANNUAL OPERA	ATING AND MAINTENANCE COSTS	
	General	\$18,000
	Regular System Maintenance/Electrical	\$36,000
	Granular Activated Carbon Maintenance (Year 0- Year	\$268,100
	Granular Activated Carbon Maintenance (Year 1- Year	\$50,002
	Post Treatment Sampling	\$90,000
	TOTAL ANNUAL COSTS	\$462,102
REPLACEMENT	COSTS	
	TOTAL REPLACEMENT COSTS (2)	\$0
PRESENT WORT	TH ANALYSIS	
PRESENT WORT		\$376.000
PRESENT WORT	Total Capital Costs (from above) (3)	\$376,000 \$2,611,000
PRESENT WORT		\$376,000 \$2,611,000 \$0

<sup>(1)</sup> Capital costs for construction items do not include oversight fees, which are accounted for separately.

<sup>(2)</sup> Replacement costs include construction and oversight capital costs.

<sup>(3)</sup> Capital costs represent the present worth of the given alternative.

<sup>(4)</sup> Present worth of annual O&M costs is based on a 7% discount rate over a life of 30 years.

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 11 ALTERNATIVE SCS-11C: SOIL VAPOR EXTRACTION (SVE) / GRANULAR ACTIVATED CARBON DETAILED COST ESTIMATE

COST COMPONENT	Unit	No Helte	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M	Start-up & Baseline Costs
COST COMP CHENT	Olik	No. Onius	Dilly Cost	\$3,000	86	812306	C0813
construction trailer (rental and delivery)	٧٢	1	\$3,300			\$3,300	<u></u>
mobilization	is .	1	\$1,000	\$1,000		421444	
demobilization	18	1	\$1,000	\$1,000			
decon facilities	68	1	\$1,000	\$1,000			·
health and safety equipment	yr	1	\$9,000			\$9,000	
electrical power service supply	yτ	1	\$3,600			\$3,600	
water supply	yτ	1	\$2,400			\$2,400	
AN MY STATE A WALL BUT IN A STATE				SERVIE.	210.8	£10000	. <u>1</u> 0
SVE well installation	- 08	5	\$6,000		\$30,000		
SVE main system	unit	1	\$18,000	\$18,000	\$6,000	\$10,000	
SVE control panels	unit	1	\$3,000	\$3,000	\$1,500	\$500	
6" carbon steel piping	ft	535	\$57	\$30,495			
4° carbon steel piping	ft	100	\$32	\$3,200			
excevation for piping placement	ft	635	\$0.67		\$425		
electrical power requirements (25 HP)	is	1	\$25,000			\$25,000	
SVE treatment building	sf	800	\$180	\$144,000	included		
air/weter separator tank	ls	1	\$5,000	\$5,000		\$500	
States Contemp Combined for the Section				. كلانالكتا	ر شار	raine.	
Vapor Phase Carbon	68	2	\$12,000	\$24,000			
First Yeer Vapor Phase Carbon Regeneration	64	20.00	\$12,000			\$240,000	
First Year Vapor Phase Carbon Disposal	lb	8040	<b>\$</b> 3			\$20,100	
First Year Vapor Phase Carbon Sampling	64	20.00	\$400			\$8,000	
the property of the decrease of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract of the contract o				<u>. فلأ</u> ه ا	<u> </u>	. ئىلىلىلىكى .	
Regeneration	68	4.00	\$12,000			\$48,000	
Dispose/	<u>lb</u>	160.8	<b>\$</b> 3			\$402	
Sampling		4.00	\$400			\$1,600	
Service to the first of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service of the service				21	<u>-</u> -	District of	
Test Kits/ Field Screening (per year)	samples	33	\$300			\$9,900	
Laboratory Analysis (VOCs, N, P) (per year)	samples	390	\$200			\$78,000	
shipping and handling (per year)	shipmt	24	\$100			\$2,400	

<sup>(1)</sup> All Post Treatment Sampling costs are presented in costs per number of samples and shipments required per year - costs are presented as annual O&M costs

### SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 11 ALTERNATIVE SCS-11C: SOIL VAPOR EXTRACTION (SVE) / GRANULAR ACTIVATED CARBON DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
Carry Com Onen	- Comment
	50'x12' construction trailer - \$1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
	Heavy equipment and trailers, per vendor estimate
I	Allowance for trailer and equipment demobilization
	Based on level of personal and vehicle decontamination anticipated for this alternative
	Allowance based on CDM equipment rates
• • •	Based on expected electrical costs per month for this alternative
	Based on expected use per month for this afternative (e.g., decon, personnel use)
man algery	Desert of expected use per fillulation as an annual state (e.g., desort, personner use)
	Cost associated with installation of SVE wells. Based on CDM experience.
372 441 1122-2001	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator,
SVF main system	condensate transfer pump, high condens, level elerm, vac, relief valve, vac, gauges, skid mnting,
	interconnecting piping and a manual motor start switch
SVF control genetal	Vendor estimate - NEEP (May 1998)
•	based on CDM experience
	based on CDM experience
• • • • • • • • • • • • • • • • • • • •	12" wide trench and backfill, 36" deep as per 1996 Means
	Based on 3-phase power, working 24 hrs/day, \$0.09/kW-hr
	Basic prefabricated building on concrete pad. Based on CDM experience.
•	Based on CDM experience
catalytic axidizenthermal treatment	Based on vendor estimates
Mary to the second of the second of the second	
Vapor Phase Carbon	Vendor estimate - Carbtrol (May 2000)
First Year Vapor Phase Carbon Regeneration	Vendor estimate - Carbtrol (May 2000)
First Year Vapor Phase Carbon Disposal	Vendor estimate - Carbtrol (May 2000)
First Year Vapor Phase Carbon Sampling	Vendor estimate - Carbtrol (May 2000)
Carrier a provide a commence of the	
Regeneration	Vendor estimate - Carbtrol (May 2000)
Disposel	Vendor estimate - Carbtrol (May 2000)
Sempling	Vendor estimate - Carbtrol (May 2000)
Marine Bullings of the State of	
	Based on CDM experience and average test kit costs - ~25 samples per test kit; samples collected
Test Kits/ Field Screening (per year)	on a grid of 1 sample/250 cy contam. mat1; 1 sampling grid per 2 weeks
	Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of 1
	sample/250cy contam. material; 1 sampling grid per month (including QA/QC samples)
shipping and handling (per year)	Costs associated with transporting samples from site to laboratory twice per month